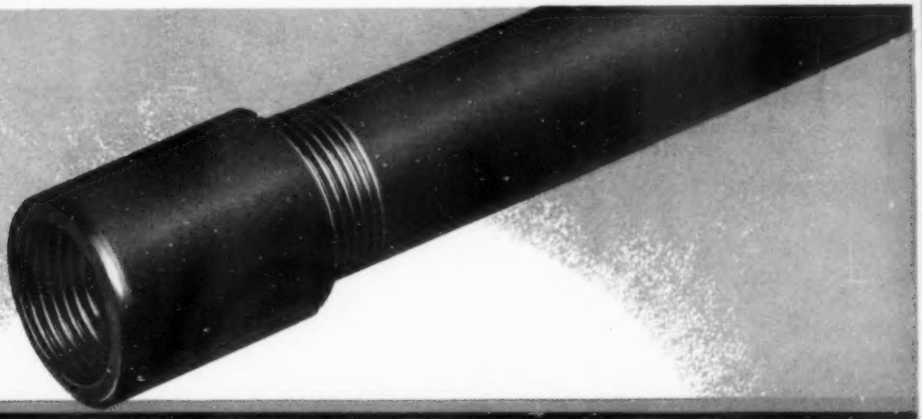
IRON & COAL

THE IRON AND COAL TRADES' REVIEW

VOL. 182
No. 4,848

Offices: John Adam House, 17/19, John Adam Street, London, W.C.2
LONDON: FRIDAY, JUNE 16, 1961

Registered as a Newspaper.
Single copies 1s. By post 1/4.
Ann. Subn.: 52s. (Abroad 66s.)



FOR MINING PURPOSES

there is nothing

stronger or cheaper than

steel tubes

PRODUCT OF

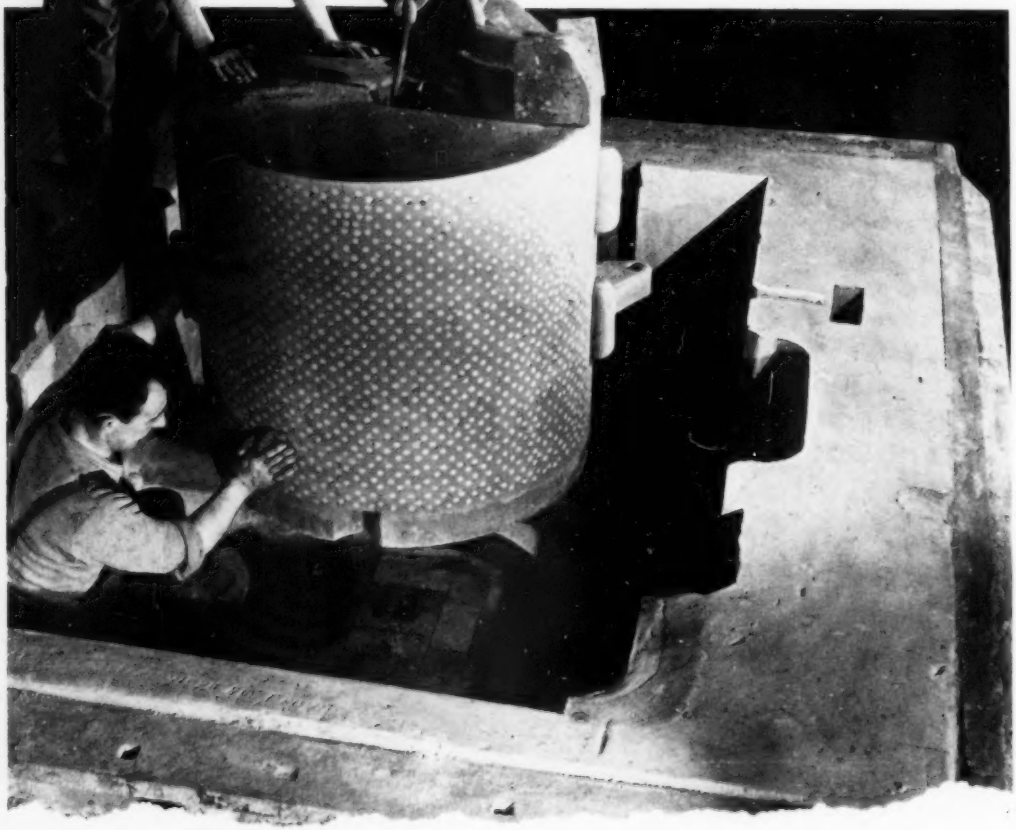
S&L

STEWARTS AND LLOYDS LIMITED · GLASGOW · BIRMINGHAM · LONDON

STEEL CASTINGS BY DAVY-UNITED

Made from closely controlled electrically melted steel, Davy-United steel castings are produced up to 15 tons in finished weight for engineering, steelworks and marine applications.

This illustration shows the setting of the core of a chock casting for a strip mill.



DAVY-UNITED | DAVY-ASHMORE GROUP

DAVY AND UNITED ROLL FOUNDRY LIMITED · MIDDLESBROUGH

LONDON SHEFFIELD STOCKTON GLASGOW HULL PARIS MONTREAL MELBOURNE SYDNEY JOHANNESBURG SALISBURY CALCUTTA BOMBAY

512a

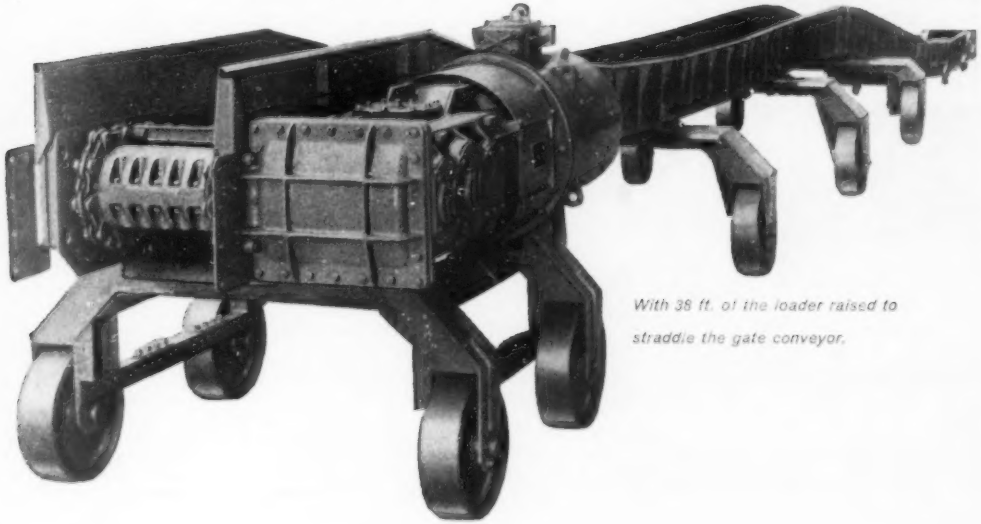
M&C ARMOURED STAGE LOADER

■ Driven by one or two 50 h.p. motors ■ Fixed length or extending up to about 150 yds. ■ Extension is by standard line pans of 7 in. armoured conveyor, which rest on the floor or are carried on wheels ■ Receiving height is low ■ Capacity with spill-plates and chain speed of 145 ft. per min.: 5 to 6 tons of coal per min.

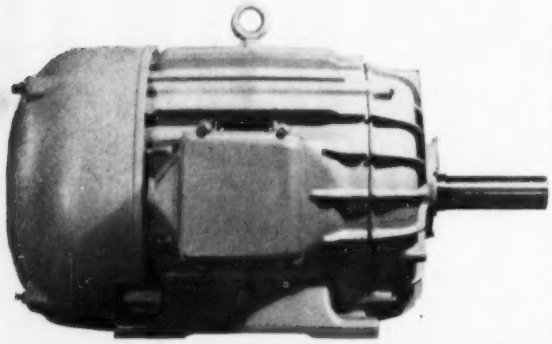
MAVOR & COULSON LTD

Bridgeton Glasgow S.E. ■ Olive Grove Rd. Sheffield 2 ■ 4 Mount Stuart Sq. Cardiff ■ 1 Eldon Sq. Newcastle-on-Tyne 1

In its shortest form, only 29 ft. long.

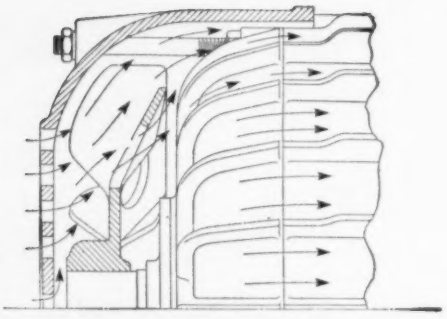


With 38 ft. of the loader raised to straddle the gate conveyor.



Engineers use the word performance in two senses, a limited one which refers to parameters that can be specified and checked, and a wider, vaguer, but essentially more realistic sense which covers reliability, freedom from trouble, ease of servicing, ready adaptability and many other things. Performance in the first sense is reproducable by any competent manufacturer; it depends on designing to well established principles. Performance in the second sense is the basis of choice between manufacturers. It comes from countless small differences in design that are based on...

This thing called know-how



Take the cooling of a T.E.F.C. motor which is more complex than it looks. The combination of fan and cowl must produce a high velocity airstream that remains close to the stator frame over its entire length, scouring any dead air tending to cling to the ribs. This has been successfully achieved on our new 'KD' range of motors to B.S.2960: Part 2: 1960 resulting in a minimum temperature difference between one end and the other. The fan that does it is worth attention. It is double bladed and the blades on the inner side direct air over the endshield. The scrubbing effect of this air ensures effective cooling of the endshield at the non-driving end.

Crompton Parkinson LIMITED

ELECTRICAL EQUIPMENT

Makers of Electric Motors of all kinds, A.C. and D.C. Generators, B.E.T. Transformers, Switchgear, Cables, Instruments, Lamps, Lighting Equipment, Batteries, Stud Welding Equipment, Traction Equipment, Ceiling Fans.

CROMPTON PARKINSON LTD · CROMPTON HOUSE · ALDWYCH · LONDON WC2

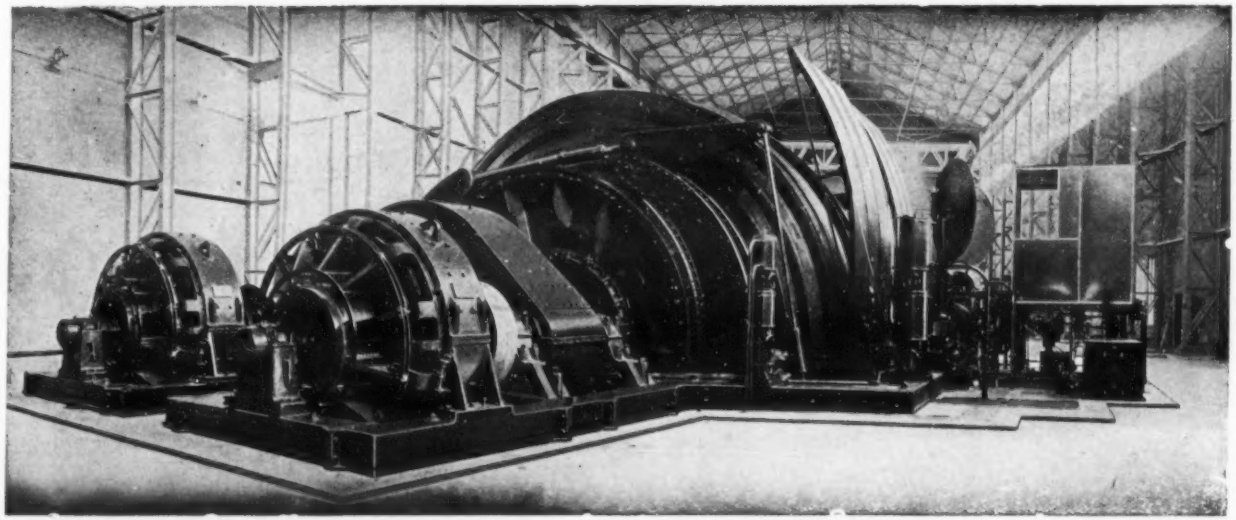
G611

Fullerton, Hodgart & Barclay, Ltd Paisley Estd. 1838

AIR COMPRESSORS
VACUUM EVAPORATORS

Steam and Electric
WINDERS

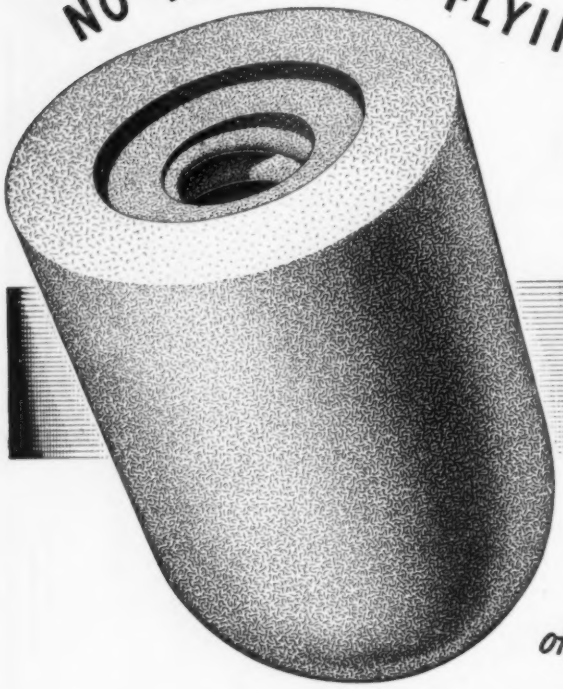
HYDRAULIC PLANT
GENERAL ENGINEERING



Gear Driven Double Central Drum Electric Winder. Drums 13/30ft. dia. Depth of wind 5,200ft. Vertical. This large Winder was one of two recently installed in South Africa.

Illustrated Catalogues will be sent on request

NO NEED FOR FLYING STOPPERS!



The New, Tough

MARSHALL

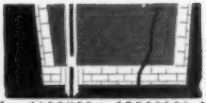
SR

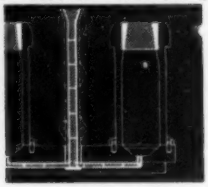
SPALL RESISTANT

STOPPER END

offers **EXTRA** *Reliability*

The focal point of teeming. The Stopper End. Subject to thermal shock, intense wear by liquid steel and severe mechanical stresses at high temperatures. No half measures with stoppers—they work or fail.
Resulting from years of development work Marshalls now present their "SR" quality. Already acclaimed and well-known in the biggest ladles of the major integrated plants, "SR" is equally satisfactory in the steel foundry and when teeming the smaller 'special' steel charges.
"SR" is highly refractory, accurately shaped —and tough. Consistently better and *COSTS NO MORE.*





LADLE BRICKS • SLEEVES • STOPPERS & NOZZLES • TRUMPETS & PIPES • CENTRE BRICKS & RUNNERS • MOULD HEAD BRICKS

MARSHALL

REFRACTORIES

THOMAS MARSHALL & CO. (LOXLEY) LTD., LOXLEY, SHEFFIELD. Tel.: 343844/5/6

one of the MARSHALL REFRACTORIES GROUP of Companies

TM39

CUT CONVEYING COSTS

Tough Edges Resist Belt Damage

Inevitable spillage—with resultant jamming of idlers imposing unfair stresses on the belt edge—is a real problem, but one which Silvertown Conveyor Belting keeps to a minimum. Good troughing limits the spillage, whilst correctly compounded and integrally moulded edges present the toughest barrier to belt rip.

Reduce your 'Cost to Produce' by specifying ....

Silvertown
CONVEYOR BELTING

SILVERTOWN RUBBER CO. LTD, HERGA HOUSE, VINCENT SQUARE, LONDON S.W.1
I/3636

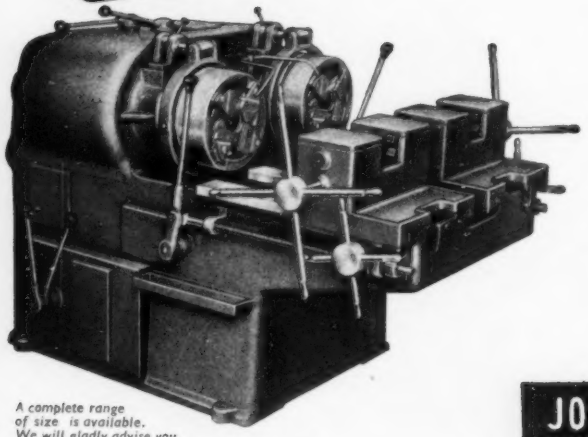
-double production

WITH

HEAP'S

2½" DOUBLE HEAD BOLT SCREWING MACHINES

Designed for really high output the HEAP'S Automatic 2½ in. Bolt Screwing Machines will cut either right or left hand threads (or both at the same time). The machine is fitted with our patent TANGENTIAL Die Heads, which open automatically when any predetermined length has been threaded. Capacity: Bolts up to 2½ in. dia. pipes up to 2 in. dia. parallel or taper.

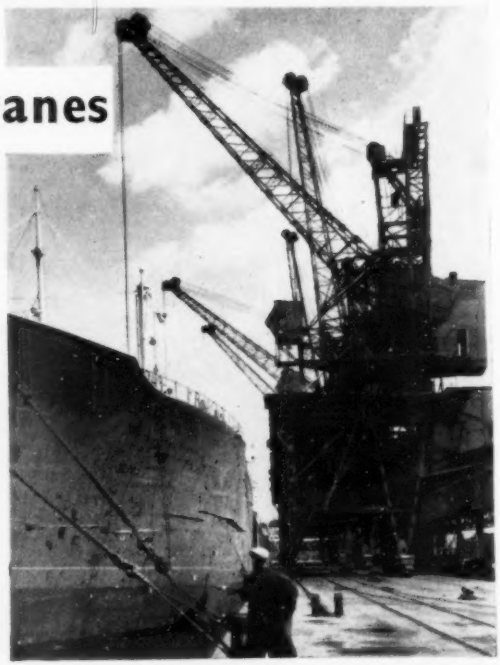


A complete range of size is available. We will gladly advise you as to the most suitable machine for your requirement. Catalogue free on request.

JOSHUA HEAP & CO., LTD.
ASHTON-UNDER-LYNE · ENGLAND

Stothert and Pitt cranes make fast work of Iron-Ore handling

Handling ore efficiently and quickly calls for special cranes of the type illustrated. Built by Stothert & Pitt, these five 10-ton cranes with a maximum radius of 80ft. are shown unloading iron ore—an operation which is considerably speeded up by the use of the built-in hoppers and transfer conveyors.



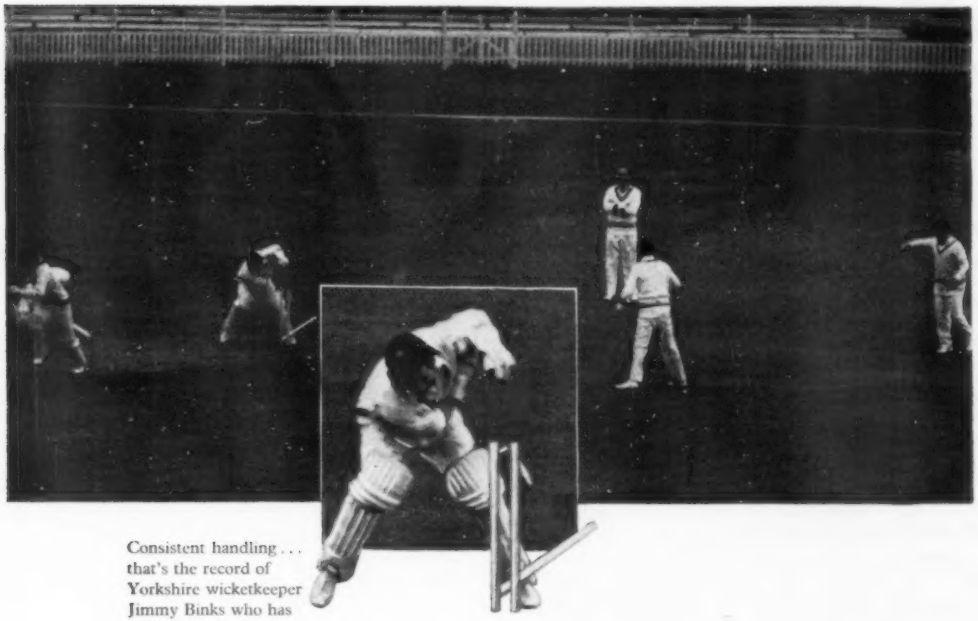
S&P LIMITED

STOTHERT & PITT LIMITED

ENGINEERS · BATH · ENGLAND

LONDON OFFICE: 38 Victoria St., S.W.1. MIDLANDS OFFICE: Lightning Way, Alvechurch Rd., West Heath, B'ham, 31

consistent handling...



Consistent handling . . . that's the record of Yorkshire wicketkeeper Jimmy Binks who has never missed a match since his first appearance for the County Champions six years ago. And when he's not standing up to Trueman expresses, he takes his place as sales engineer in the Fenner power transmission team during the winter months.

Coal needs consistent handling, too—the top-class, reliable handling of the new Fenner Diamond range of conveyor belting. Here is a belting that stands up to any pace, on wickets sticky or otherwise, without conceding the unnecessary extras of breakdowns and production losses.

Like Jimmy Binks, Fenaplast Diamond is the first choice where consistency of performance is vital.

Fenaplast

DIAMOND TYPE COLLIERY CONVEYOR BELTING

A PRODUCT OF

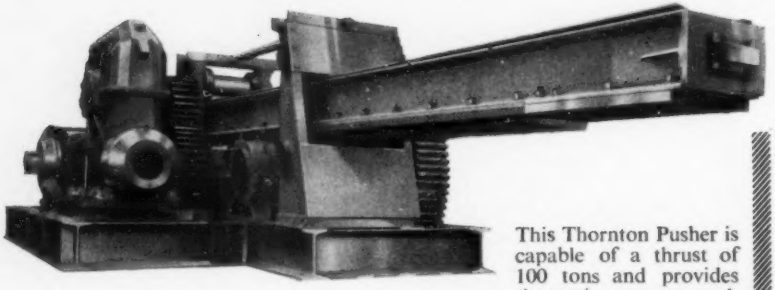
J. H. FENNER & CO. LTD. HULL

LARGEST MAKERS OF V-BELT DRIVES IN THE COMMONWEALTH

FACTORIES OVERSEAS IN AUSTRALIA, INDIA & SOUTH AFRICA

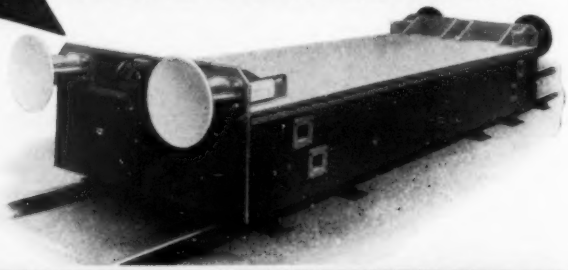
THORNTON

ANOTHER 100 TON FURNACE PUSHER...



This Thornton Pusher is capable of a thrust of 100 tons and provides the motive power to push a continuous train of ingot or slab furnace cars through the furnace.

60 TON CAPACITY CAR FOR SHOT BLASTING...



We designed this car with all-round rubber screening to provide added protection when bearing heavy castings for cleaning in a shot-blast chamber.

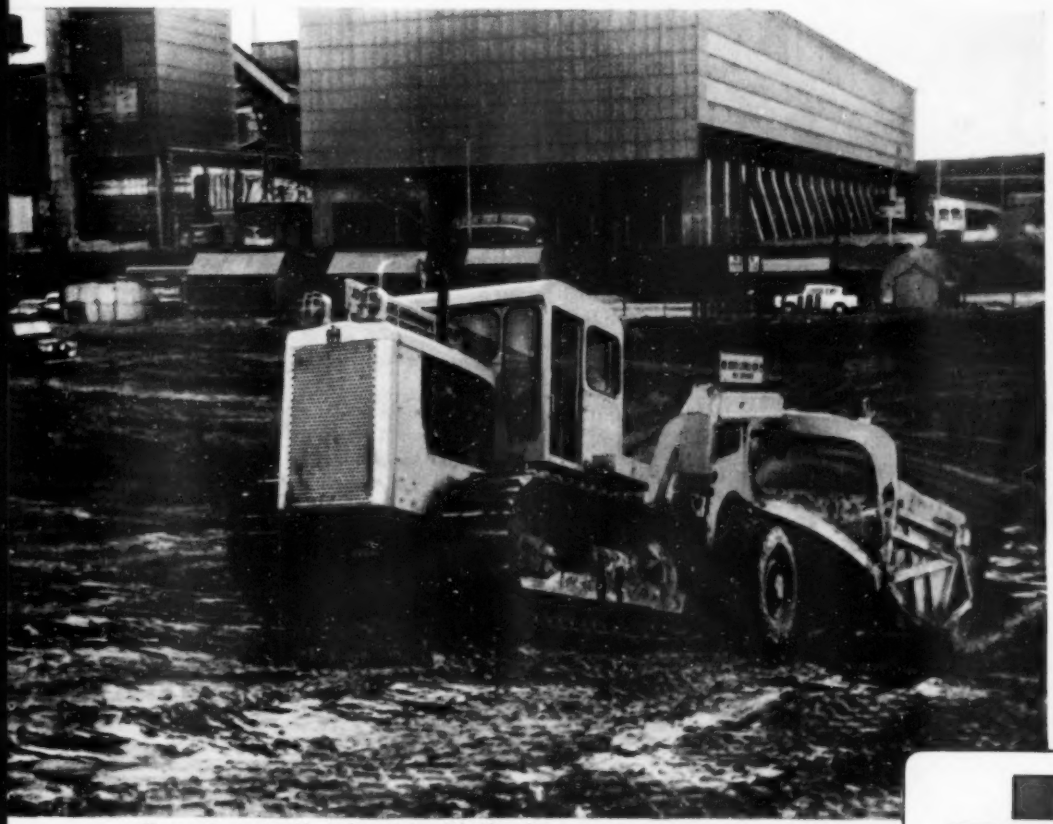
Specify THORNTON Equipment

Built to our own designs or to customers specification

B. THORNTON LTD. TURNBRIDGE, HUDDERSFIELD. Tel 7541

CRIPPS

for the finest on tyres and tracks



Photograph reproduced by kind permission of the Mines Department of Lysaght's Scunthorpe Works, a branch of G.K.N. Steel Co. Ltd.

Lysaght's Scunthorpe Works use a fleet of International BTD-20 and 10/14 yd. scraper units for the continuous task of removing heavy overburden at their ironstone quarries adjacent to the steel works. Illustrated in action is one of these outfits, which continue to provide a significant contribution to Britain's vital Steel Industry.

INTERNATIONAL HARVESTER

INTERNATIONAL
CONSTRUCTION EQUIPMENT EXHIBITION
CRYSTAL PALACE
London 15-24 June 1961
See us on stands
No. B14, C30 & D64

R. CRIPPS & COMPANY LIMITED

NOTTINGHAM, Tel: 71161.
MANCHESTER, Tel: Trafford Park 1658. SHILDON, (Co. Durham) Tel: 261.

* Corrugated sheets, plates, angles, tees, channels, R.S. joists, reinforcing rounds for immediate delivery. Profile cutting to customers' requirements.

CONTACT

C & D

COX AND DANKS LIMITED

BIRMINGHAM
Scapa Works
Langley Green
Oldbury, Birmingham
Tel: Broadwell 1611
Telex 33183

MANCHESTER
Frederick Road
Pendleton
Salford 6
Tel: Pendleton 2481
Telex 66448

SHEFFIELD
Scapa Works
Wadsley Bridge
Sheffield 6
Tel Sheffield 344391
Telex 54205

LONDON
Scapa House
Park Royal Road
London N.W. 10
Tel: Elgar 5811
Telex 25239

And at Newcastle, Bedford, Cardiff, Bow, Coventry and Belfast

A METAL INDUSTRIES GROUP COMPANY

ST16

RTB

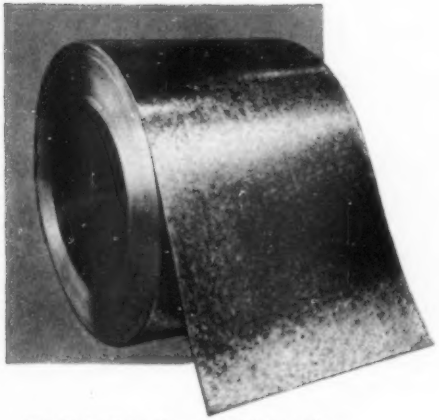
Speltafast

with the spelter coating that holds fast

GALVANIZED SHEETS

Uniform coating

High resistance to corrosion



'Speltafast' is also available in coils, 2240 lbs. min.

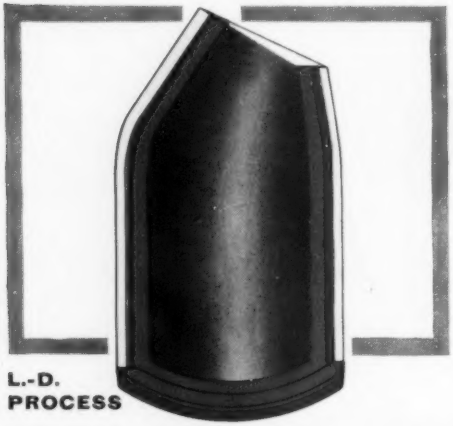
Easy 'workability'

'Speltafast', with its tight and uniform coating, is so well bonded that it will withstand seaming and lock forming, and all stamping and drawing operations within the range of the steel base.

'Speltafast' is available in plain sheets up to 48" wide (depending on gauge), in gauges from 18 to 32, and in lengths from 36" to 144". Corrugated sheets are available in various profiles.

Richard Thomas & Baldwins (Sales) Limited

Sheet and Plate Department, 47 PARK STREET, LONDON, W.1 — Telephone: Mayfair 8432
MITRE WORKS, EAGLE STREET, WOLVERHAMPTON — Telephone: Wolverhampton 27771
613-620 ROYAL EXCHANGE, MANCHESTER 2 — Telephone: Deansgate 7525



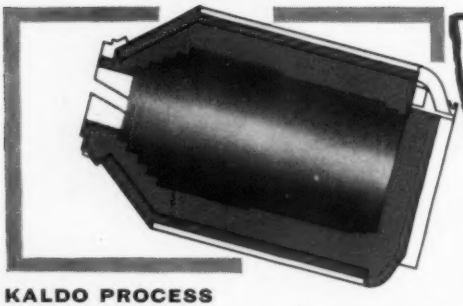
L.-D. PROCESS

GR '341'

DOLOMITE BRICKS

for

OXYGEN & PNEUMATIC STEELMAKING

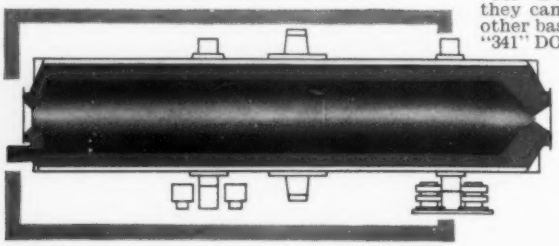


KALDO PROCESS

"341" DOLOMITE bricks are manufactured from a dolomitic limestone which in the natural state approaches in chemical composition the mineral dolomite $CaCO_3.MgCO_3$. The raw dolomite is dead-burned at high temperatures and it is then formed into suitable shapes by a new and unique brick-making process. Tunnel kiln firing at high temperatures produces a dense, volume stable and truly basic refractory of exceptional quality.

"341" DOLOMITE bricks are resistant to hydration and they can be transported and stocked in the same way as other basic bricks.

"341" DOLOMITE bricks are manufactured in various sizes designed to suit many applications.



ROTOR PROCESS

'341' DOLOMITE BRICKS

SUPERMAG BRICKS OR FERROCLAD 100 EE

Typical Chemical Analysis

SiO_2	TiO_2	Fe_2O_3	MnO	Al_2O_3	CaO	MgO
2/3%	0.2%	1/2%	0.1%	1/2%	48/50%	36/40%

Typical Physical Properties

TRUE POROSITY %	18/20
BULK DENSITY grams per c.c.	2.70/2.75
SPECIFIC GRAVITY	3.35
SPECIFIC HEAT	0.25
PERMEABILITY c.g.s. units	0.05
COLD CRUSHING STRENGTH p.s.i.	+8,500
Kilos sq. cm.	+ 600
SPALLING INDEX (small prism test)	Cycles +30
PERMANENT LINEAR CHANGE 2 hrs. at 1,500° C.	Nil to 0.2%
WEIGHT PER CUBIC FOOT	175 lbs.
WEIGHT PER CUBIC METRE	2,700 kilos
WEIGHT PER 1,000 BRICKS 9" x 4½" x 3" approx.	11,700 lbs.
"	5,300 kilos

"341" DOLOMITE bricks are specially made to withstand the excessive temperatures and turbulent erosive conditions produced in modern pneumatic and oxygen steel processes. "341" Dolomite bricks, being fired to a state of volume stability provide a dolomite lining in its best and most economic form for use in all modern steel converter units.
Please contact our Technical Service Department for further particulars of these and other applications for G.R. "341" bricks.

THE GENEFAX GROUP for Everything in Refractories

443

GENERAL REFRACTORIES LTD

GENEFAX HOUSE • SHEFFIELD 10 • Telephone: SHEFFIELD 31113

NCB

CHOOSE COLES FOR THE DEVELOPMENT OF NEW ANTHRACITE MINE

. . . influenced, of course, by past experience. At Cynheidre their latest acquisition, a Coles "AENEAS", handles thousands of tons of incoming material for three new shafts consistently and efficiently. In addition, its automatic built-in safety features have favourably impressed its safety-conscious owners who readily endorse the major part it is playing in the development of their latest enterprise.

* Registered Trade Mark

COLES* CRANES

THE NAME THAT CARRIES WEIGHT

STEELS ENGINEERING PRODUCTS LIMITED

HEAD SALES OFFICE: STEEL HOUSE, EASTCOTE, PINNER, MIDDLESEX.

SALES AND SERVICE: LONDON, BRISTOL, BIRMINGHAM, MANCHESTER, LEEDS, NEWCASTLE, GLASGOW.

693

MINING EQUIPMENT

CRAWLEY

CRAWLEY WILCOX CONTINUOUS MINERS
CRAWLEY MIDGET MINERS
LO-HITE ARMOURED SNAKING CONVEYORS
HEAVY DUTY SNAKING CONVEYORS
STATIONARY BUNKER-CONVEYORS
MOBILE BUNKER CONVEYORS
EXTENSIBLE STAGE LOADERS
MOBILE STAGE FEEDERS
MOBILE STAGE LOADERS
EXTENSIBLE TUB LOADERS
MOBILE & EXTENSIBLE STAGE
COAL BUNKER UNITS

Write for **CRAWLEY** *"Mining Equipment" Catalogue NOW!*

THE CRAWLEY MIDGET MINER

Operation

1 As boring arms rotate coal passes from one arm to next until outer arm loads on to conveyor.
2 Peripheral side cutting chain clears the coal not loaded by trepanning arms and completes loading.

Semi-Automatic Control

Can be fitted with sensing device consisting of gamma ray source which automatically adjusts vertical height of machine depending upon the relative thickness of coal and rock between the source and the receiver due to preferential scattering by rock as compared with coal.

Appreciation

1 The first practical thin seam miner.
2 The first thin seam miner under semi-automatic control.

A Low Seam Wide Buttock Loader For Seams 18 in. and upwards.

Performance

1 Seams 18 in. to 30 in.
2 Depth of cut 4ft. 6in. to 4ft. 9in.
3 200 tons per shift in 2ft. 6in. seam actually achieved.

Specifications

1 Single-ended longwall cutting machine with four boring arms phased at an angle of 72° to each other.
2 Boring arms operated ahead of periphery chain clearing uncut and unloaded coal.
3 Chain includes flight picks bored to ensure complete coal loading.
4 Water jet dust suppression system.
5 Cutting height adjusted by fitting jib inserts.

All Crawley Heavy Duty Machines have the following units standard and interchangeable:

DRIVE FRAME • GEAR BOX • GEAR ASSEMBLIES
EXTENSION SECTIONS • STRUCTURE • TAIL UNIT
CHAIN FLIGHTS

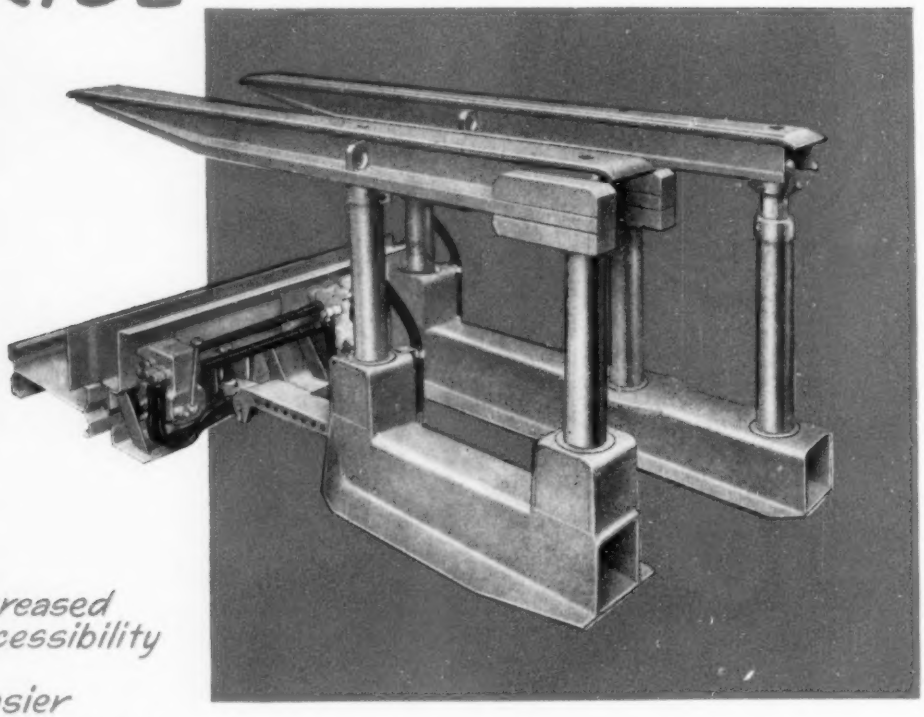
AYLING INDUSTRIES GROUP

CRAWLEY

ROOFMASTER MK I.B

Roofmaster Reliability at a New

LOW PRICE



✳ *Increased Accessibility*

✳ *Easier Maintenance*

Another step forward by DOWTY

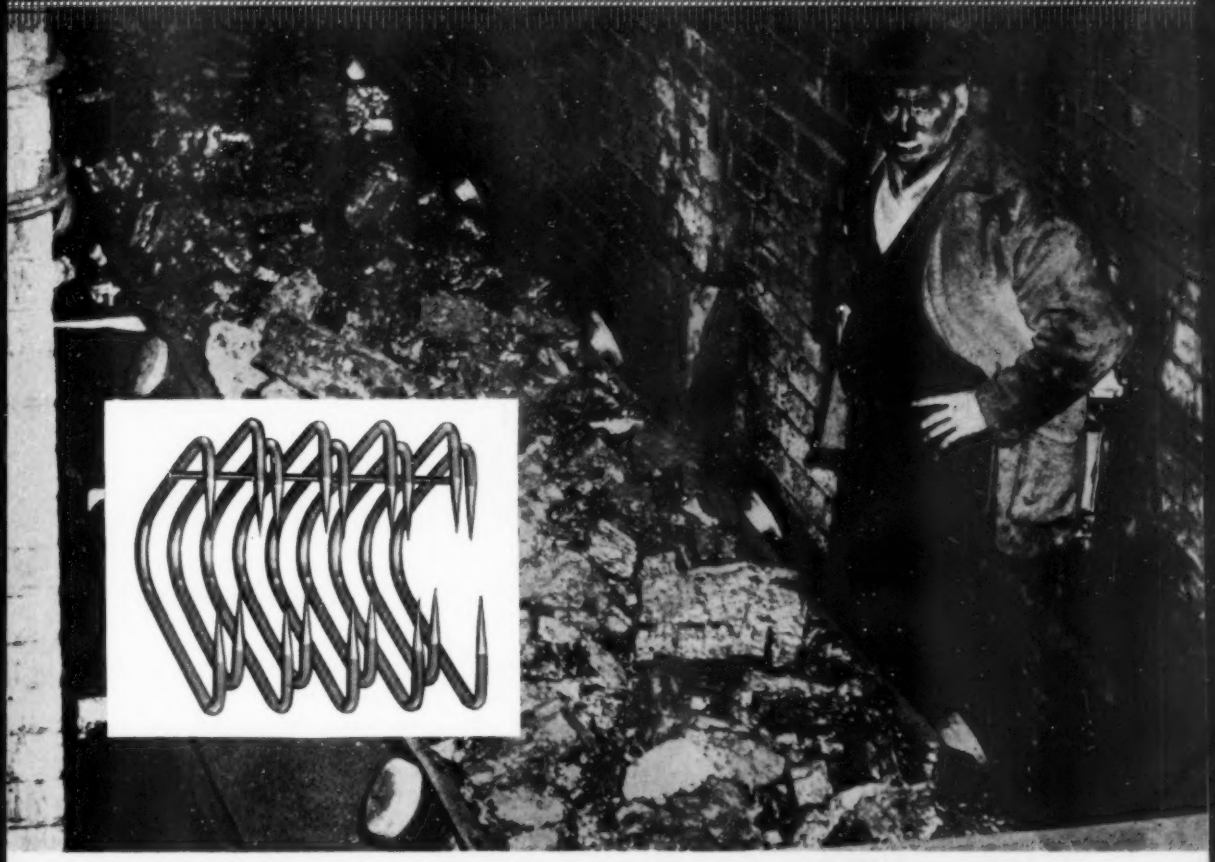
DOWTY MINING EQUIPMENT LTD · ASHCHURCH · GLOS

Member of the Dowty Group

MASTABAR KNOW-HOW

gives you 25% Greater Strength....

ENSURES EFFICIENT JOINTING OF NEW STRONGER BELTS



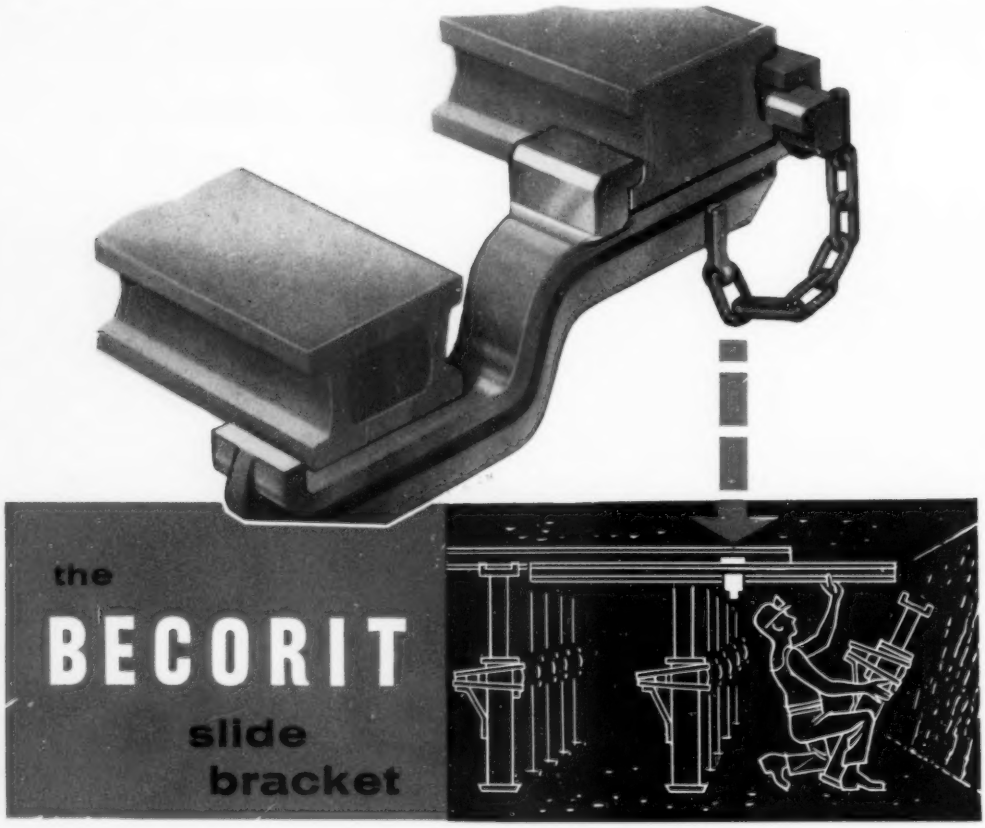
Mastabar Superior Design....
Quality Control of Material....
Rigorous Testing during Manufacture
and complete Rust Protection
all combine to achieve the strongest
(by 25%) most secure joint
of any system anywhere.

Comet

COLLIERY CONVEYOR BELT LACING SYSTEM

STOCKS AVAILABLE AT: ACCRINGTON · NOTTINGHAM
LONDON · LEEDS · CARDIFF · NEWCASTLE-UPON-TYNE

MASTABAR MINING EQUIPMENT CO. LTD.
AVENUE PARADE, ACCRINGTON, LANCASHIRE
TELEPHONE: 35411 (3 lines)



reduces
work
and
saves
time

The Becorit Slide Bracket has been designed for use with stagger-bar systems of support particularly with reference to prop-free front faces. The bracket eliminates the necessity for bars to be lowered to the ground and lifted again and therefore reduces work in support setting and saves time.
It is erected quickly, is extremely robust and is suitable for use on all Groetschel Section Bars.
Brackets can be made to fit any section.

BECORIT (G.B.) LTD. 2 Leslie Road, Gregory Boulevard, Nottingham. Telephone: 72207/8/9.

BECORIT (S.W.) LTD. 29 High Street, Cardiff, Wales. Telephone: 25492.

BECORIT (G.B.) LTD. 42 Frederick Street, Edinburgh 2, Scotland. Telephone: Caledonian 5432.

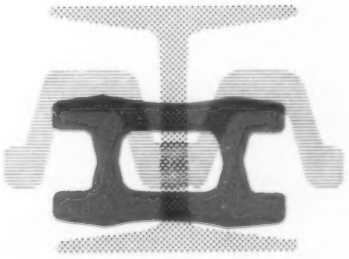
BECORIT (G.B.) LTD. 29 Mosley Street, Newcastle-on-Tyne. Telephone: 24720.

MESSRS. E. WHEATLEY LTD. 13 Rockingham Street, Sheffield 1. Telephone: 25774.

the GROETSCHEL K. 45 Roof Bar

This Bar in an entirely new section, is made of the same special alloy steel as other Groetschel roof bars. It can be used for face or roadway support. It is ideally suited for slide bar and stagger bar systems. It's advantages include great strength for a comparatively shallow section and suitability for thin seam work.

These bars can be supplied with fixed prop locations and in sections up to 15 ft. long. The Groetschel K. 45 Section is twice as strong as W. Section in vertical bending for comparable weight.



Patents Applied for.

BECORIT (G.B.) LTD., 2 Leslie Road, Gregory Boulevard, Nottingham · Telephone: 72207/8/9
BECORIT (S.W.) LTD., 29 High Street, Cardiff, Wales · Telephone: 25492
BECORIT (G.B.) LTD., 42 Frederick Street, Edinburgh 2, Scotland · Telephone: Caledonian 5432
BECORIT (G.B.) LTD., 29 Mosley Street, Newcastle-upon-Tyne · Telephone: 24720
Messrs. E. WHEATLEY LTD., 13 Rockingham Street, Sheffield 1 · Telephone: 25774

Keep production

moving...

G-type structures

are designed to do just that. They are extremely reliable, easily fixed or dismantled, and capable of being slung. The idler rollers are precision-made and grease-sealed to ensure a long, almost frictionless life. The sections are 9 ft. long and are made for 26 in., 30 in., 36 in. or 42 in. belts. Intermediate Loading Sections with impact roller nests are available for side loading points.

BJD

BRITISH JEFFREY-DIAMOND LTD., WAKEFIELD YORKS. LONDON: 15-17 CAXTON STREET, SW1

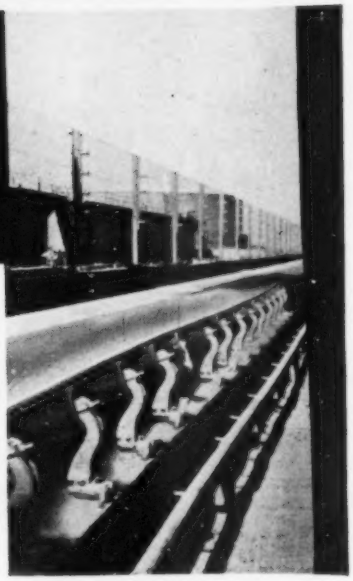
WF5215

1,200 TONS of COAL AN HOUR

can be delivered into the boilers by U.S. Rubber Conveyor Belting to fuel Scotland's largest Thermal Power Station at Kincardine.

130, 886, 134 TONS of ABRASIVE COPPER IN 12 YEARS

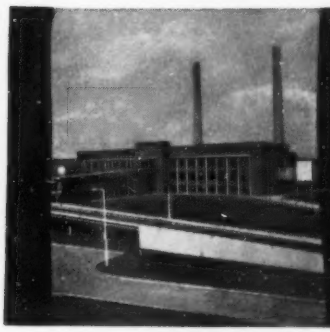
has been moved by the Chilean Exploration Co. using U.S. Rubber Belting which steadfastly resisted both abrasion and exposure to the sun.



Moving Facts

500 TONS of PHOSPHATE AN HOUR

is conveyed down this rugged mountainside in Georgetown, Idaho, U.S.A. by a mile-long U.S. Rubber Conveyor Belt.



450,000 TONS of REFUSE IN A YEAR

is the "payload" of this mile-long stretch of U.S. Rubber Belting in operation at the Glasgow Corporation's refuse disposal plant at Polmadie.

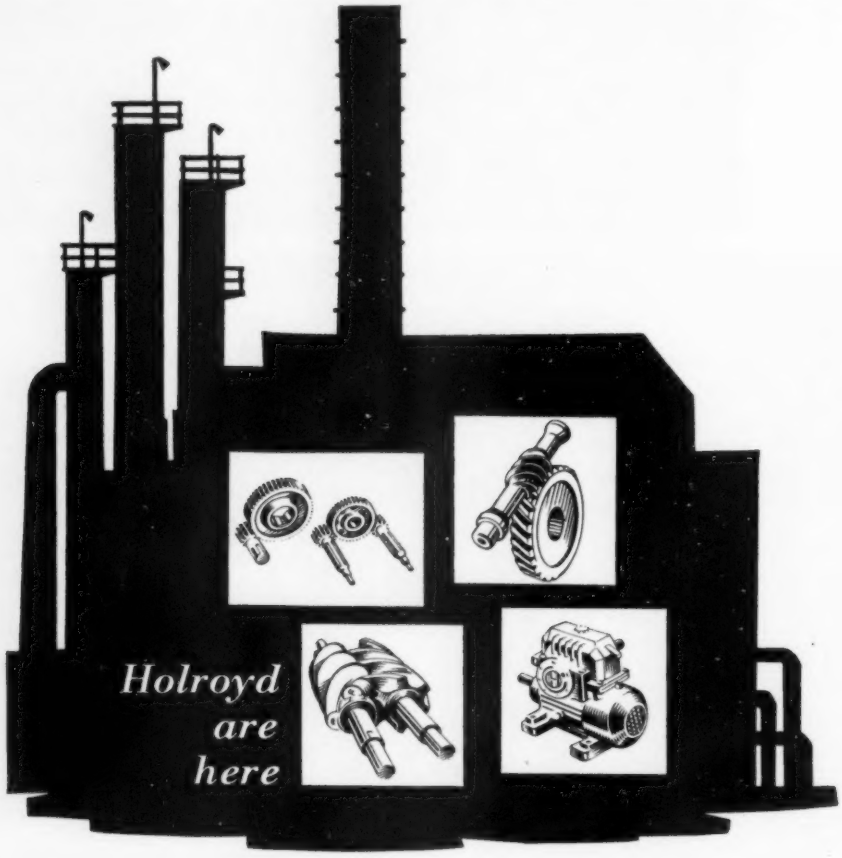
These are the facts to convince you—tough, reliable U.S. Rubber Conveyor Belting can really take the strain under the most rugged conditions, the most punishing loads . . . outliving all competitors by thousands of working hours, positively *refusing* to wear out wherever it's on the job! Speak to the experts at North British about your conveying problems.

US RUBBER

North British CONVEYOR BELTING

THE NORTH BRITISH RUBBER CO. LTD.
Sales Office: 62/64 Horseferry Road, London, S.W.1.
Tel: Abbey 5611. Factories: Edinburgh and Dumfries.

ALSO WORLD FAMOUS FOR: OIL, AIR, STEAM & WATER HOSE · POWERGRIP TIMING BELTS · DOCK FENDERS · EXPANSION JOINTS

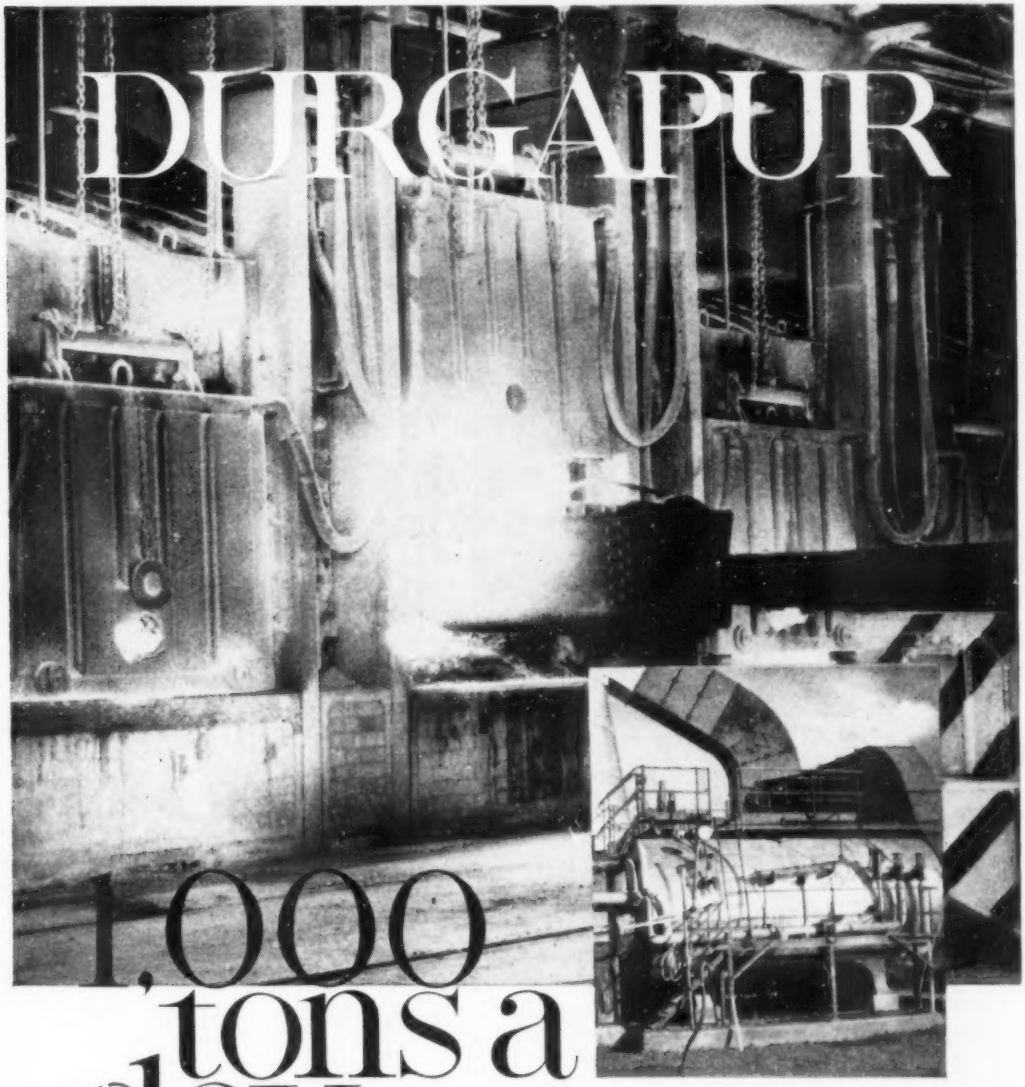


In industrial works all over the world, Holroyd products play a part in manufacture and distribution. Their unfailing reliability, based upon a century's experience in forward-looking engineering, has made Holroyd a famous name in their specialised branch of engineering. Technical advice, practical service and distribution abroad are available from representatives in more than thirty countries all over the world.

Say HOLROYD first for—
Worm gears & gear boxes • Spur & helical gears • Compressor rotors Holfos bronze • Machine tools

JOHN HOLROYD & CO LTD · MILNROW · ROCHDALE · LANCASHIRE

CRC B11



1,000 tons a day

but not only of steel. This is also the amount of steam generated by S-B-C waste heat boilers at Durgapur. The Spencer Bonecourt boiler shown above, inset, and six others like it, produces from 10,000 to 20,000 lbs of steam per hour—at 200 lbs per sq. in. S-B-C waste heat boilers were chosen by The Wellman Smith Owen Engineering Corporation Ltd., to operate in conjunction with their 200 ton open hearth melting furnaces for Indian Steelworks Construction Co. Ltd.

On any question relating to the recovery of waste heat, S-B-C are the people to contact. Write in today for the illustrated booklet: "Waste Heat Recovery".

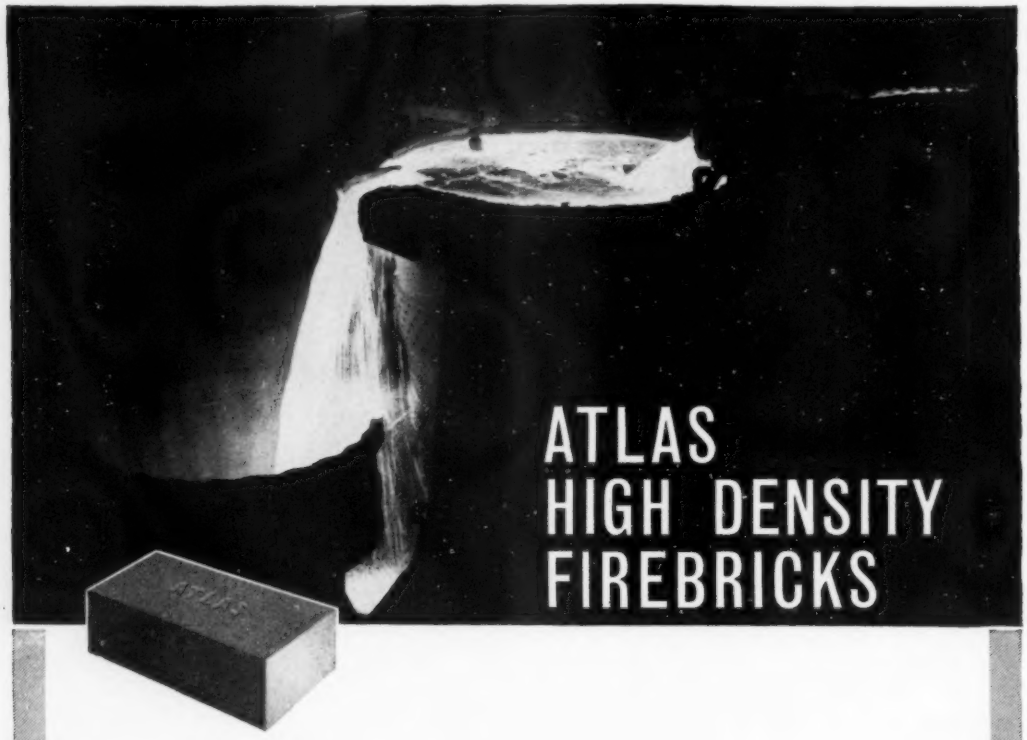
SBC

SPENCER-BONECOURT-CLARKSON LTD. *Leaders in Waste Heat Recovery*

A subsidiary company of Babcock & Wilcox Ltd.

28 EASTON STREET · LONDON · W.C.1 Telephone: Terminus 7466

SBC21b



ATLAS HIGH DENSITY FIREBRICKS

No firebrick can withstand high temperatures and heavy loads indefinitely.

But **ATLAS HIGH DENSITY** Firebricks have the maximum life possible under such conditions. They have been produced specifically for ladle linings and are quite unique in their performance in bottoms and the striking areas. High crushing strength and great resistance to penetration, erosion and abrasion have been combined to ensure a long working life.

Use **ATLAS HIGH DENSITY** Firebricks and line less often.

ILLUSTRATION

Tapping a furnace at Abbey Melting Shop, Steel Company of Wales Ltd. Ladle Bottoms are ATLAS Firebricks.

UNITED FIRECLAY PRODUCTS LTD

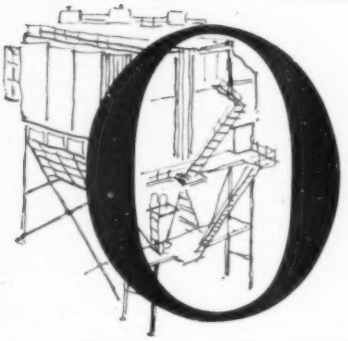
BATHVILLE · ARMADALE · WEST LOTHIAN

REGISTERED OFFICE · 140 West George Street · Glasgow C.2

Telephone: ARMADALE 313-316 Telegrams: "Combined" Armadale

A MEMBER OF THE WOODALL-DUCKHAM GROUP OF COMPANIES

23 PRECIPITATORS



FOR OPEN-HEARTH FURNACE

AND CONVERTER GAS-CLEANING

Twenty-three precipitator units at five of Britain's major steelworks—that is the total ordered, so far, from Lodge-Cottrell and Simon-Carves. Six are already on line and another six are scheduled to start up this year.

Experimental methods of dealing with air pollution can be very costly. As first in this field in this country, we are in a unique position to advise you. Take advantage of the combined knowledge and up-to-the-minute experience of Lodge-Cottrell and Simon-Carves. You are assured of the least expensive solution in the long run.

LODGE-COTTRELL

SIMON-CARVES

MEMBER COMPANIES SIMON ENGINEERING LTD

LODGE-COTTRELL LTD, GEORGE STREET, PARADE, BIRMINGHAM 3, ENGLAND

and at London, Brussels, Calcutta, Johannesburg, Sydney, Toronto

SC 625

Machining

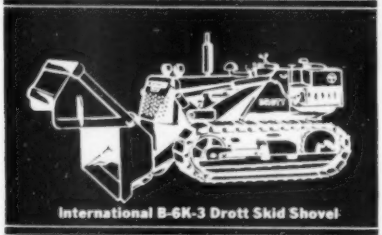
Nowadays it is remarkable how few products of our Forge leave the works without some degree of machining. What is not remarkable however, is the unusually high levels of skill found in the Firth Brown Machine shops—and it's not remarkable because so much of this latent skill has been handed down from father to son in these very shops. Here then is but another example of that personal element which is represented in the Special Alloy Steel Forgings made by Firth Brown.

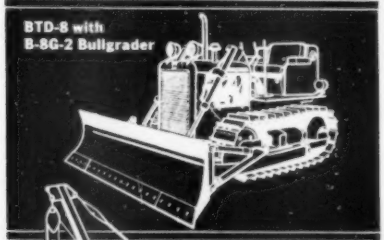
FIRTH BROWN

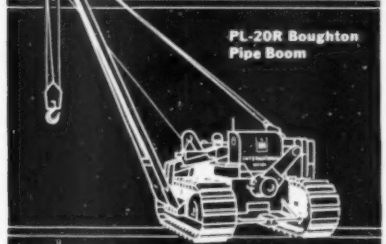
ALLOY STEELMAKERS • FORGEMASTERS • STEEL FOUNDERS • HEAVY ENGINEERS

THOS. FIRTH & JOHN BROWN LIMITED • SHEFFIELD • ENGLAND

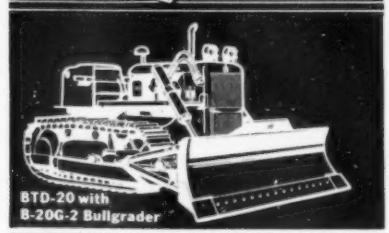
Industrial B-275
for International Wain-Roy Back-Hoe


International B-6K-3 Drott Skid Shovel


BTD-8 with
B-8G-2 Bullgrader


PL-20R Boughton
Pipe Boom

International B-20K-3
Drott Skid Shovel


BTD-20 with
B-20G-2 Bullgrader

FOR DEPENDABLE PROFIT-EARNING POWER . . .

choose from the **International** range

All over Britain—on earthmoving, quarrying, mining, logging and pipelining projects—International crawler tractors and their matched equipment are continually proving their ability to win *big* profits—*fast!*

And in the rubber-tyred category, the world-famous International Hough BH-70 Payloader (2 cubic yards) speeds up every aspect of bulk materials handling more easily and at less cost.

Today, more and more contractors are standardising on International Construction Equipment, because International meets the three needs of the contractor—reliability . . . economy . . . service. Get these profit-winning units (and their matched equipment) earning for you! Your International Construction Equipment dealer will gladly supply full specifications and details of hire-purchase facilities.

MATCHED EQUIPMENT

BTD-6, 50 b.h.p.—Bullgrader Winch, Pipeboom, Scraper, International Drott Skid-Shovels and Drott 4-in-1 (1 cubic yard). BTD-8 (80 series), 60 b.h.p.—Bullgrader, Winch, Scraper. BTD-20 (200 series), 124 b.h.p.—Bullgraders (hydraulic or cable), Pipeboom, Coal-handling Blade, Scraper, Winch, International Drott Skid-Shovels and Drott 4-in-1 (3 cubic yards). B-275 (Industrial), 35 b.h.p.—International Wain-Roy Back-Hoe and Industrial Front-End Loader.

International CONSTRUCTION EQUIPMENT DEALERS IN GT. BRITAIN AND N. IRELAND:

JAMES BOWEN & SONS LTD
Edinburgh, Glasgow, Aberdeen

R. CRIPPS & CO LTD
Nottingham, Manchester, Shildon

SAVILLE (TRACTORS) LTD
London, Stratford-on-Avon, Cardiff, Belfast, Exeter, Salisbury

International
CONSTRUCTION EQUIPMENT
The finest on tyres and tracks

INTERNATIONAL HARVESTER

INTERNATIONAL HARVESTER COMPANY OF GREAT BRITAIN LIMITED · HARVESTER HOUSE · 259 CITY ROAD · LONDON EC1

THESE THINGS DON'T HAPPEN

IF YOU KNOW THE ROPES

These photographs show some typical instances of damage to ropes and associated equipment caused by mishandling, wrong fitting or neglect. In each case serious damage was caused to the Wire Rope and considerable expense was involved in replacement and loss of output.

"*Give your Ropes a Chance*" by reading the Martin-Black series of leaflets which contain much useful and interesting information. We will be pleased to send your copy/copies on request.

MARTIN BLACK

WIRE ROPES

MARTIN, BLACK & CO. (WIRE ROPES) LTD., SPEEDWELL WORKS, COATBRIDGE, NEAR GLASGOW
Telephone : COATBRIDGE 567 (PBX) *Telex :* 77376

London: " Number Twentyfive " Curtain Road, E.C.2. — *Telephone:* BISHOPSGATE 6667/8/9 — *Telex :* 21361
Liverpool: 31 N. John Street, 2. — *Telephone:* CENTRAL 0924 (2 lines)
Nottingham: 640 Woodborough Road, Mapperley. — *Telephone:* NOTTINGHAM 64397, 66055/6 — *Telex :* 37542
Newcastle-on-Tyne: 4 Stockbridge, Manor Chare. — *Telephone:* NEWCASTLE 2-1282 — *Telex :* 53362
Cardiff: The Exchange, Mount Stuart Square — *Telephone:* CARDIFF 32162

STOCKS AND SPLICING FACILITIES AT LONDON, LIVERPOOL AND NOTTINGHAM

LOW COST CRUSHING BY IMPACT

High tonnage throughput with reduction ratios as high as 100:1 with some materials is possible with the Joy-Hazemag Impact Crusher. Choose from a range of 20 sizes — from 3 to 500 tons per hour capacity. Small, compact Joy-Hazemag Crushers offer low capital and operating costs — give efficient and economical crushing for a wide range of materials. Write for booklet giving full details and specification.

The Joy-Hazemag breaks material by impingement — uses less power and less space than conventional crushers. The principle! Material enters crusher against chain curtain, controlling feed rate — is flung violently against impact plates in crusher by fast-rotating blow bars mounted on rotor. Result? Material hitting impact plates — and itself — breaks up along natural lines of cleavage or weakness. Gives uniform, well cubed product of great strength. Selectively reduces mixed materials — separates coal/ores from stone, metal from slag, etc.

JOY-HAZEMAG Impact CRUSHERS

JOY-SULLIVAN LIMITED · CALLYWHITE LANE · DRONFIELD · NR. SHEFFIELD

HC1

Performance way above its class!

A 163 b.h.p. diesel engine, 4 forward and 4 reverse speeds, two way shuttle-operation, power-assisted steering, and a high-power weight ratio, give the SL 13½ ton dumper a performance record excelling that of any 15 ton machine. Highly manoeuvrable—it has a 47 ft. turning circle; it is fast —25 m.p.h. loaded; and has a 10 second tip. For low cost earthmoving there is nothing in its class comparable with the Aveling-Barford SL 270 Dumper.

For full particulars write for Catalogue No. 1810.

Aveling-Barford

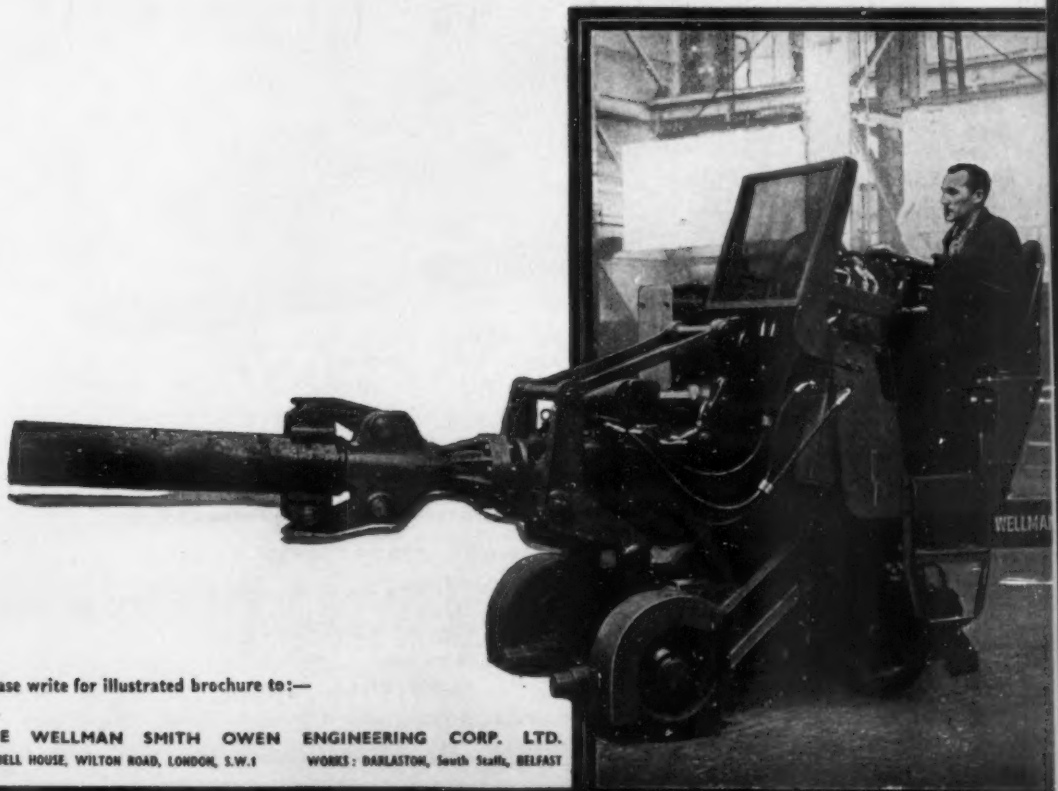
SL 13½ TON DUMPER

AVELING-BARFORD LTD.
GRANTHAM · ENGLAND

Another Wellman new development . . . . . .

¼ ton Mobile Forging Manipulator specially designed for Small Forges

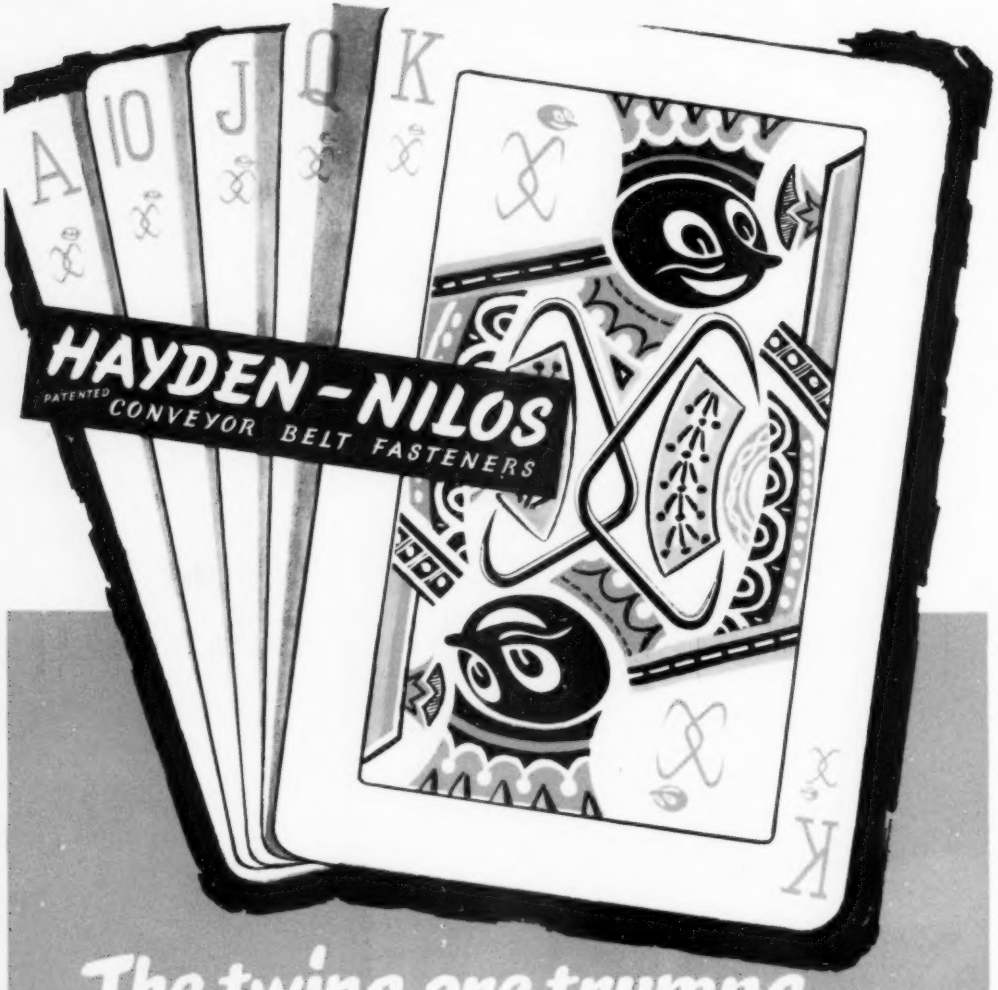
Fast in Operation. Turns about on its own wheel base. Ensures accurate placing of the billet during forging. Maintains a truly parallel adjustment of the height of the bar during forging. Rotation of the grip head can be stopped accurately in any desired position. Recoils from the forging blow without oscillation thus providing a steady action—essential when forging to close limits. Permits a good view of the workpiece to the driver. Easy access to all parts facilitates maintenance.



Please write for illustrated brochure to:—

THE WELLMAN SMITH OWEN ENGINEERING CORP. LTD.
PARNELL HOUSE, WILTON ROAD, LONDON, S.W.1 WORKS: DARLASTON, South Staffs, BELFAST

INCREASES OUTPUT • REDUCES COSTS • SAVES SPACE
ELIMINATES ARDUOUS LABOUR • MINIMISES DANGEROUS ACCIDENTS



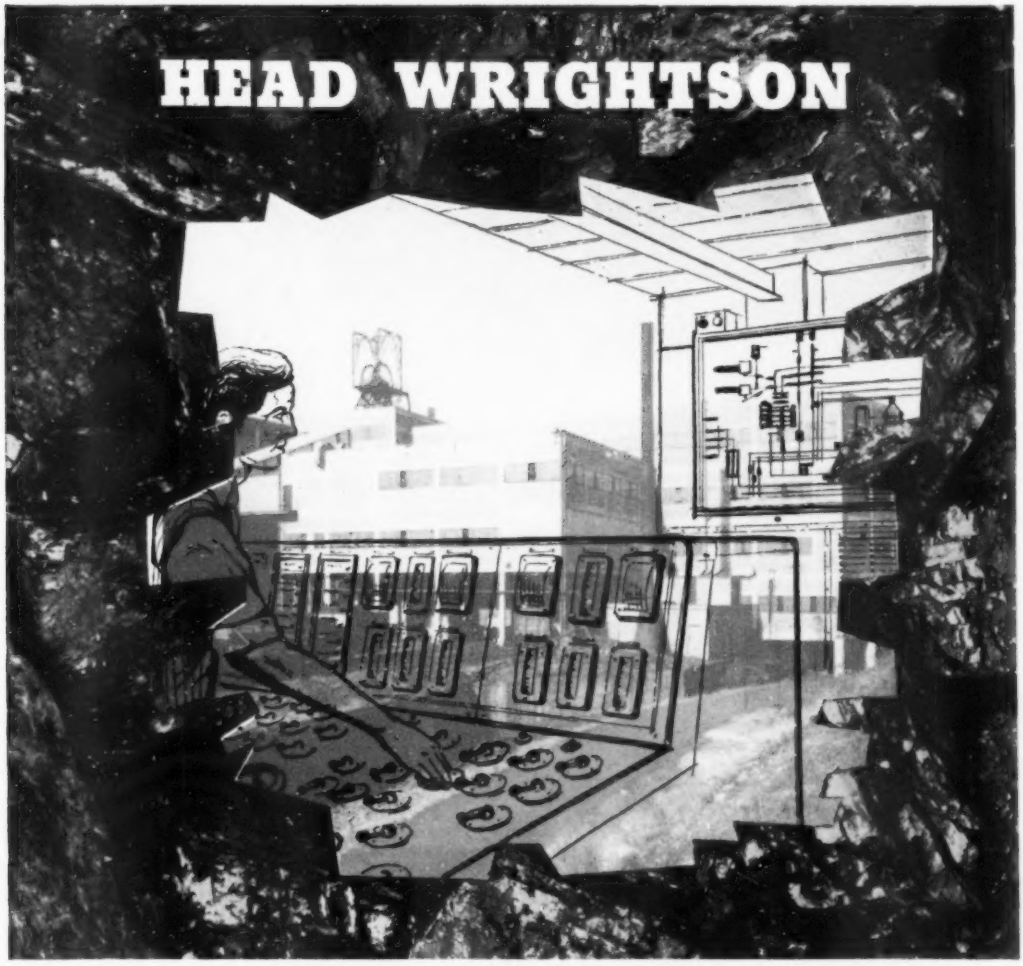
The twins are trumps

. . . when the call is for the highest possible joint strength
on the new synthetic fibre belts.
The finest equipment, the finest service
and technical knowledge eliminate all chances . . . . . .
remember the belts on the most arduous duties
in the industry are serviced by Hayden-Nilos

HAYDEN-NILOS LIMITED · DARNALL ROAD · SHEFFIELD 9

Telephone: Sheffield 42001/4 Telegrams: "Hayden Sheffield"

HN.596



LOOKING FORWARD

in colliery engineering

Our extensive experience in all fields of colliery engineering enables us to offer a comprehensive service for the design and construction of complete colliery surface plant. The central Research and Development Division of the Head Wrightson Group gives full support to our constant endeavour to improve plant and equipment design and to secure the maximum automatic control within the Plant.

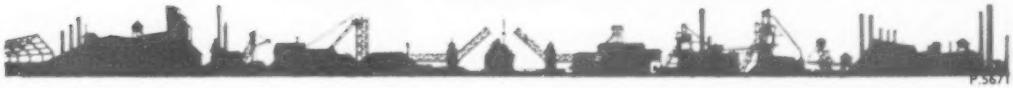
Write for our brochures

COAL PREPARATION • CYCLONE WASHING FOR COAL AND MINERALS • STRIPA PROCESS

HEAD WRIGHTSON MINERALS ENGINEERING LIMITED

46 RUTLAND PARK SHEFFIELD • TEESDALE IRON WORKS THORNABY-ON-TEES

LONDON • JOHANNESBURG • SYDNEY • CALCUTTA

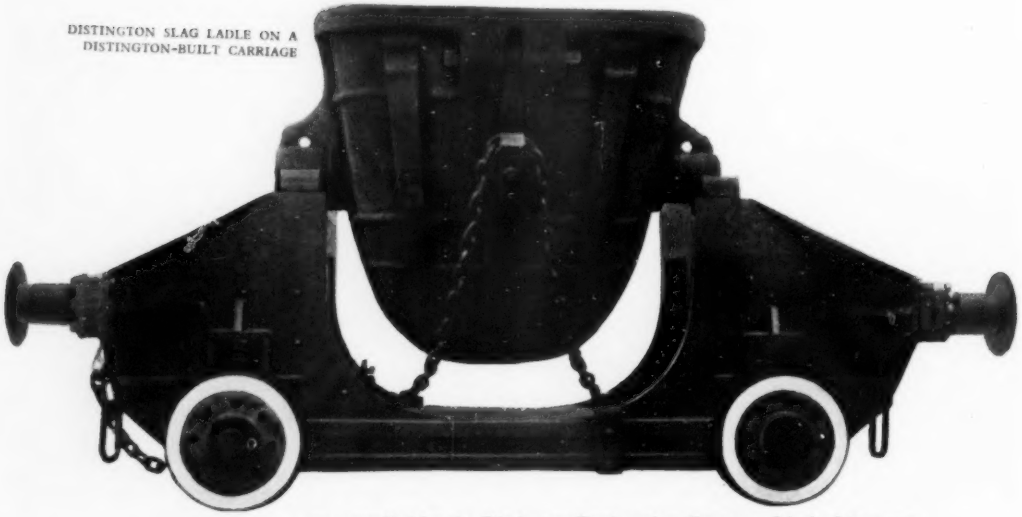


P.5671

3

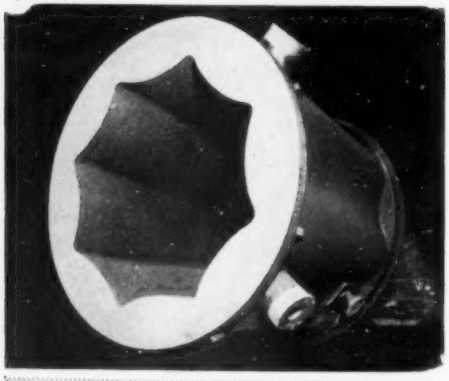
INGOT MOULDS SLAG LADLES STEELWORKS PLANT AND EQUIPMENT

DISTINGTON SLAG LADLE ON A DISTINGTON-BUILT CARRIAGE



are supplied by the Distington Engineering Company Limited to many steelworks. The Distington foundry has the highest output of any ingot mould foundry in Europe, and specialises in the production of ingot moulds and slag ladles. It can handle castings up to 120 tons in weight.

OCTAGONAL FORGING INGOT MOULD



DISTINGTON

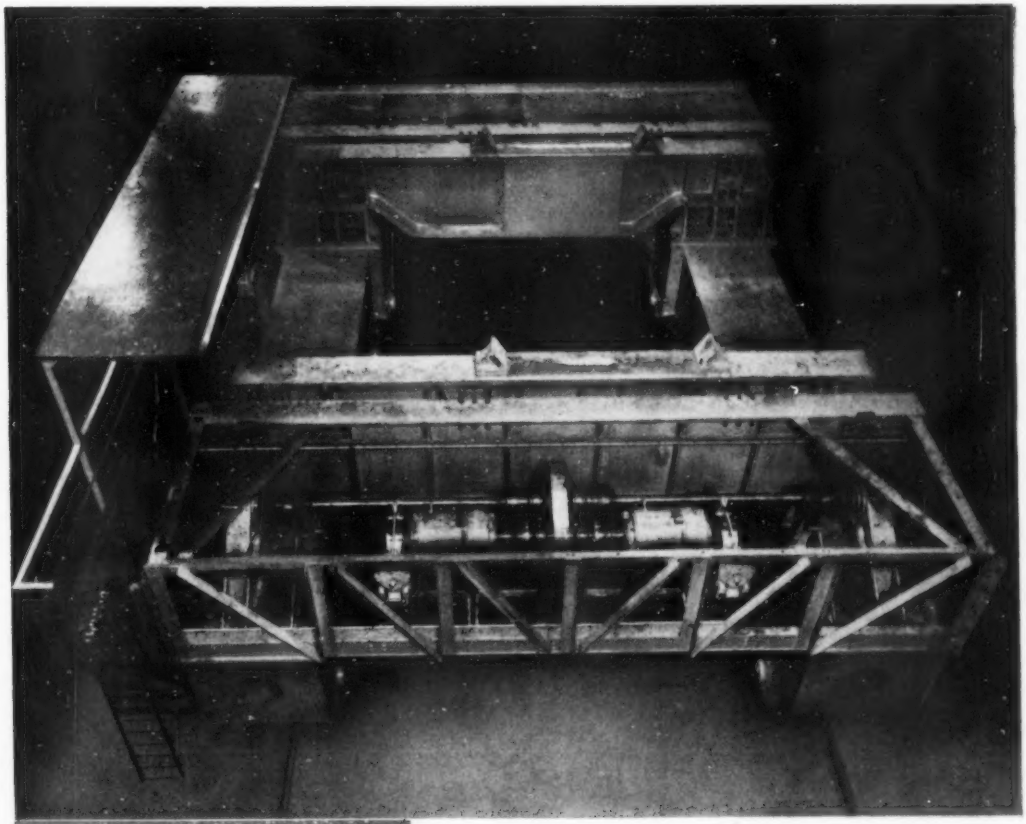
DISTINGTON ENGINEERING COMPANY LIMITED

WORKINGTON CUMBERLAND

A subsidiary of The United Steel Companies Limited

CA20

HANDLING HOT METAL THE DISTINGTON WAY



DISTINGTON

This hot metal transfer car was designed and built by Distington Engineering Company Limited. Its total capacity is 200 tons, and fully-loaded weight 373 tons. The track gauge is 18′ 6″, while two 30 h.p. D.C. electric motors give a maximum speed of travel of 85 feet per minute. Distington also produce iron castings, steelworks plant and equipment, mining machinery, and general engineering products.

DISTINGTON ENGINEERING COMPANY LIMITED

WORKINGTON, CUMBERLAND

A subsidiary of The United Steel Companies Limited.

THE UNITED STEEL COMPANIES LTD

TD 10A

DOLLERY &

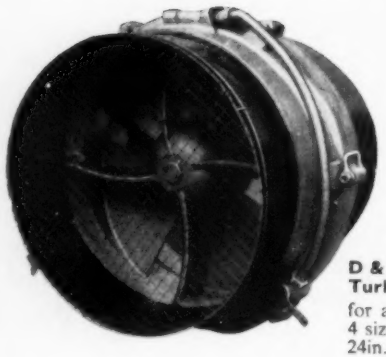
Pneumatic Tools

Type H II AN
wt. 27 lbs.
Blows/min. 520
Consumption 25 cu. ft./m.
CHISEL OR POINTED STEELS

Vulkollan
Indestructible Handle
for ELIMINATING VIBRATION AND RECOIL
and EASIER HANDLING

Type H 7 17½ lbs.
&
Type H 9 20¾ lbs.
ONLY 5 MAIN COMPONENT PARTS

DP 21 Rotary Drill Wt. 20¼ lbs.
3.5 H.P. 550 RPM
Consumption (100 cu. ft./min.)
for use in COAL AND MEDIUM STONE
OPTIONAL WET DRILLING ATTACHMENT



D & P Pneumatic
Turbine Fans
for auxiliary ventilation
4 sizes 12, 16, 20 and 24in. diam.

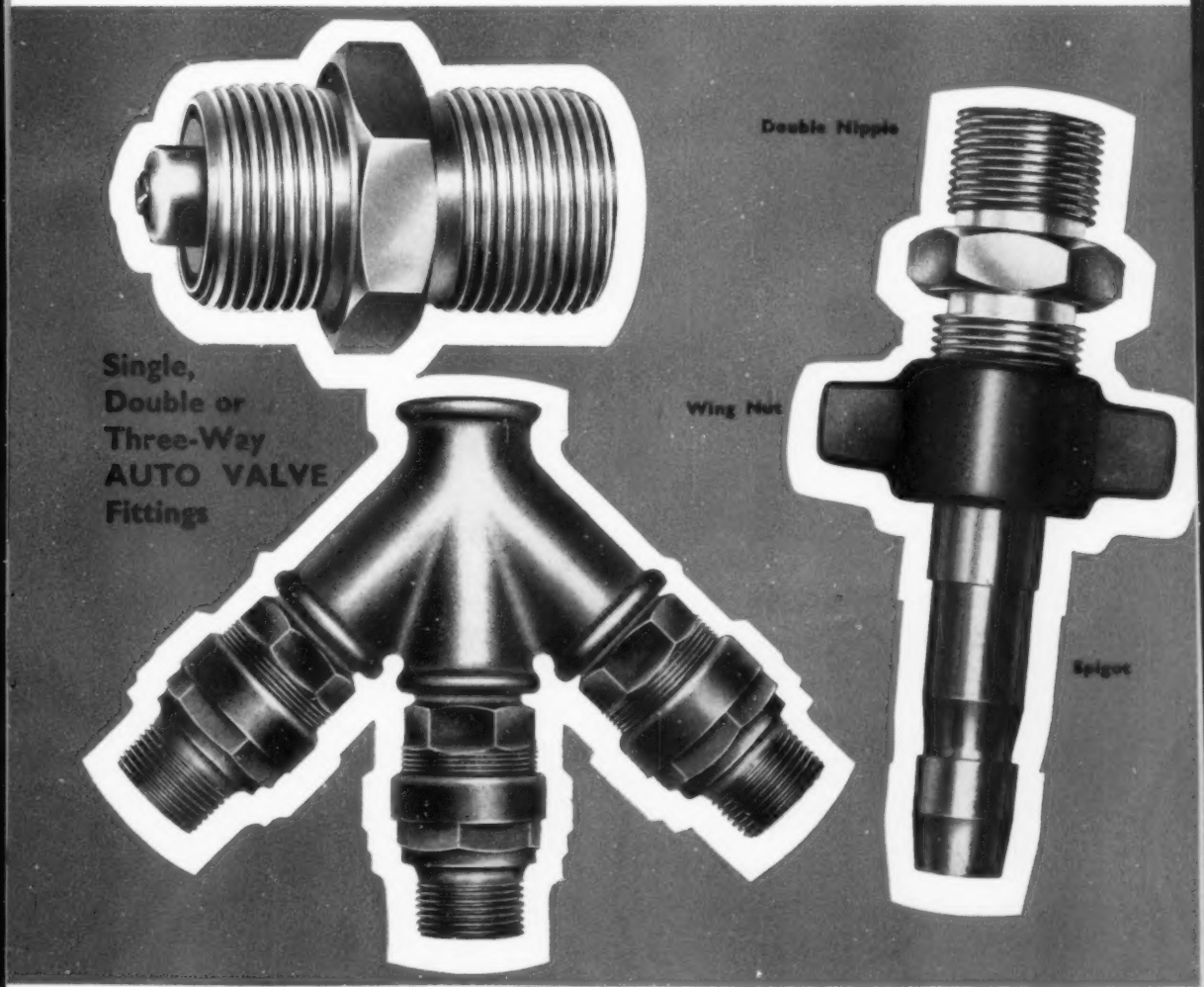
PALMER LTD

D&P

ACCESSORIES FOR PNEUMATIC TOOLS

Original Auto Valves

for use between air main and hose and for eliminating valves or projecting cocks and avoiding leakages. Entirely automatic in action.



DOLLERY & PALMER LTD

54 VICTORIA STREET
LONDON SW1
TEL.: VIC. 2494

LYDGATE LANE
SHEFFIELD 10
TEL.: 64516

BELMOS NCB STANDARD RANGE

SBU.1 CIRCUIT BREAKER
200 ampere rating
BUXTON-CERTIFIED for Group I gases—Certificate No. 4242
Breaking capacity tested to 8.1 MVA at 550 V 0.25 power factor
Earth leakage protection with intrinsically safe lockout circuit
Intrinsically safe circuit for remote " Emergency Stop " control and electrical interlock

SGU.2 GATE-END BOX
150 ampere rating
BUXTON-CERTIFIED for Group I gases—Certificate No. FLP 3925
On-load isolating switch with tested breaking capacity of 1,200 amperes
" Long range " solenoid type overload relay
Earth leakage protection with intrinsically safe lockout circuit

SDU DRILL CONTROL UNIT
2.5 kVA transformer for supplying one 3 h.p. or two 1½ h.p. drills
BUXTON-CERTIFIED for Group I gases—Certificate No. 4087
On-load isolating switch
Individual reversing switch for each drill
Earth leakage protection with intrinsically safe lockout circuit

SLU LIGHTING TRANSFORMER
4.5 kVA transformer for supplying one 40 ampere or three 13 ampere lighting circuits at 115 volts
BUXTON-CERTIFIED for Group I gases—Certificate No. 4180
Output voltages of 115, 125, 230 and 250 volts—easily selected by changeover links
Individual circuit breakers to protect each secondary circuit

SGU.30 GATE-END BOX
Up to 25 h.p. at 550 volts
BUXTON-CERTIFIED for Group I gases—Certificate No. FLP 4318
Earth leakage protection with intrinsically safe lockout circuit
Intrinsically safe remote control circuit complying with NCB SPECIFICATION P130/1955
Stalled-current-breaking isolating switch
Remote control and sequence interlocking facilities

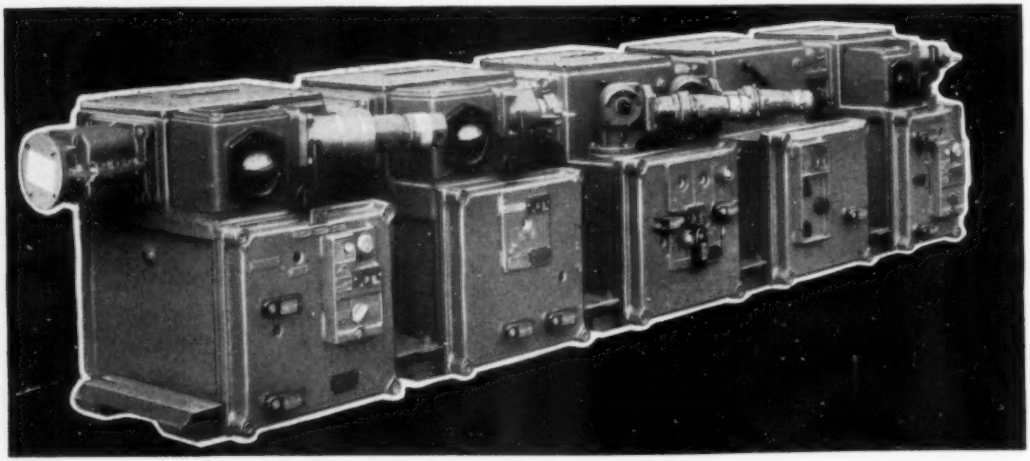
Over forty years devoted exclusively to the manufacture of motor control gear have earned for Belmos equipment a name for reliability and trouble-free service.

Area offices are established throughout the country staffed by control gear specialists who will be happy to advise on any installation problem.

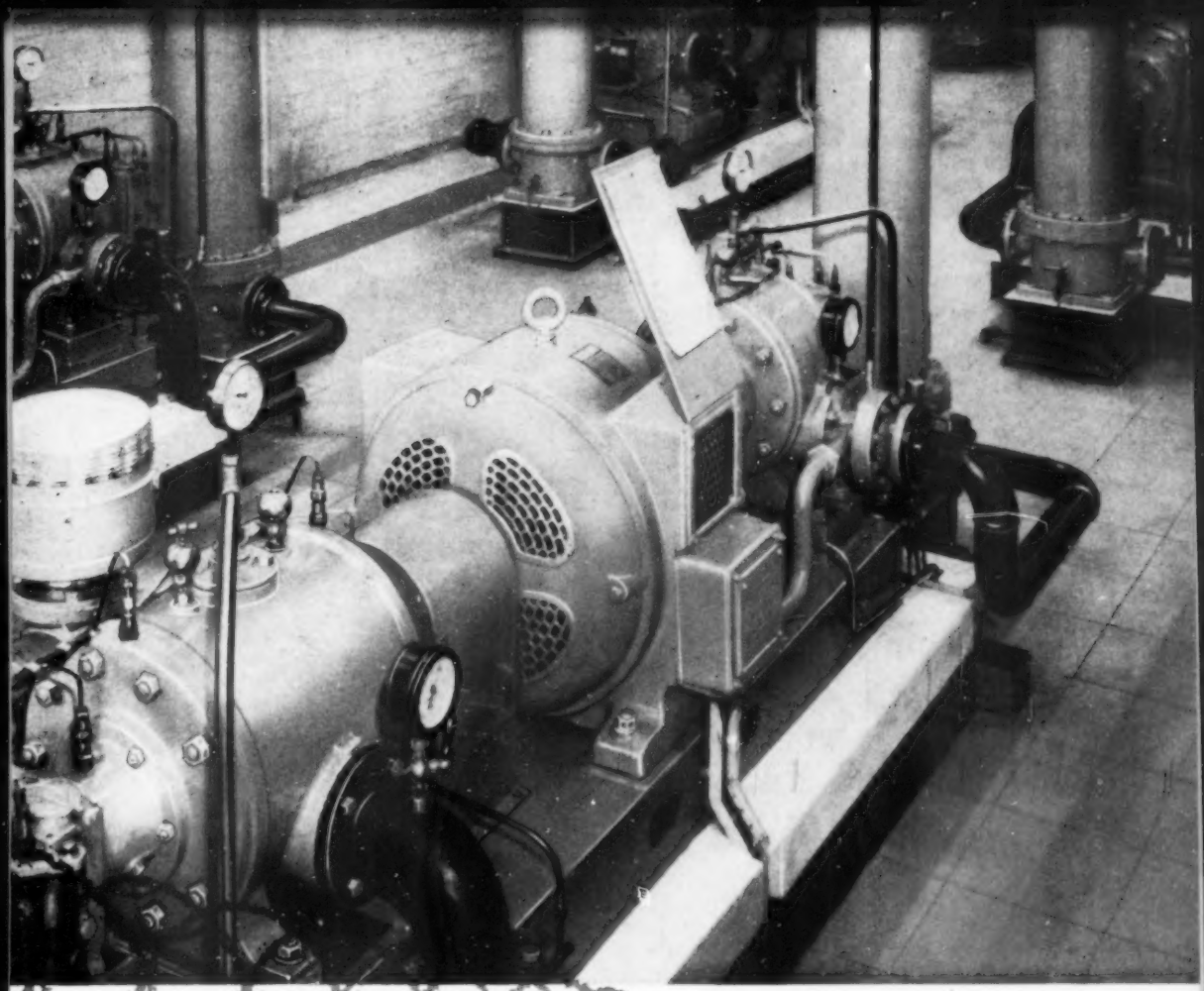
Belmos
of Bellshill

LONDON GLASGOW
BIRMINGHAM NEWCASTLE
MANCHESTER SHEFFIELD
CARDIFF

THE BELMOS COMPANY LIMITED BELLSHILL LANARKSHIRE



PAM 4048

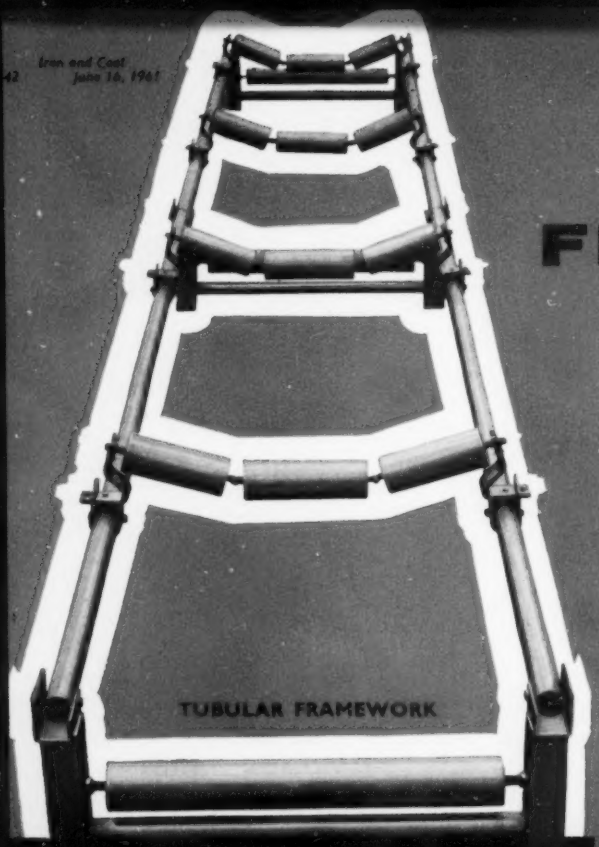


Rotary Compressors and Vacuum Pumps

The Hick Hargreaves Rotary Compressor is of the eccentric rotor type, with sliding steel blades which are prevented from making contact with the cylinder walls by restraining rings. High rotational speeds can thus be achieved without great frictional losses. Hick Hargreaves Rotary Compressors have many other advantages—easy and cheap installation; retention of initial high performance; regular air flow and low noise level; easy maintenance due to the absence of moving valves, and the reduction of wear to a minimum by the use of roller bearings. A comprehensive range of both single and two-stage compressors and vacuum pumps is available with capacities up to 2,000 c.f.m.

The photograph shows some of the twenty Hick Hargreaves Compressors and Vacuum Pumps at one of Messrs. Mullards Factories.

Hick Hargreaves AND COMPANY LTD. BOLTON



Sutcliffe

FRAMEWORK

takes good care of your coal

TUBULAR FRAMEWORK

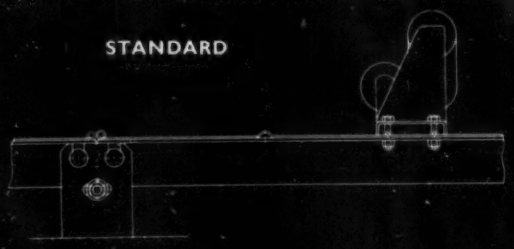
The latest addition to the Sutcliffe range, tubular framework, is designed to give resilience to the belt under all load conditions. The automatic variation in depth of trough reduces the dangers of belt damage and coal degradation.

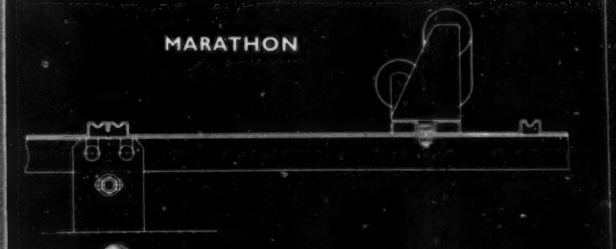
MARATHON FRAMEWORK

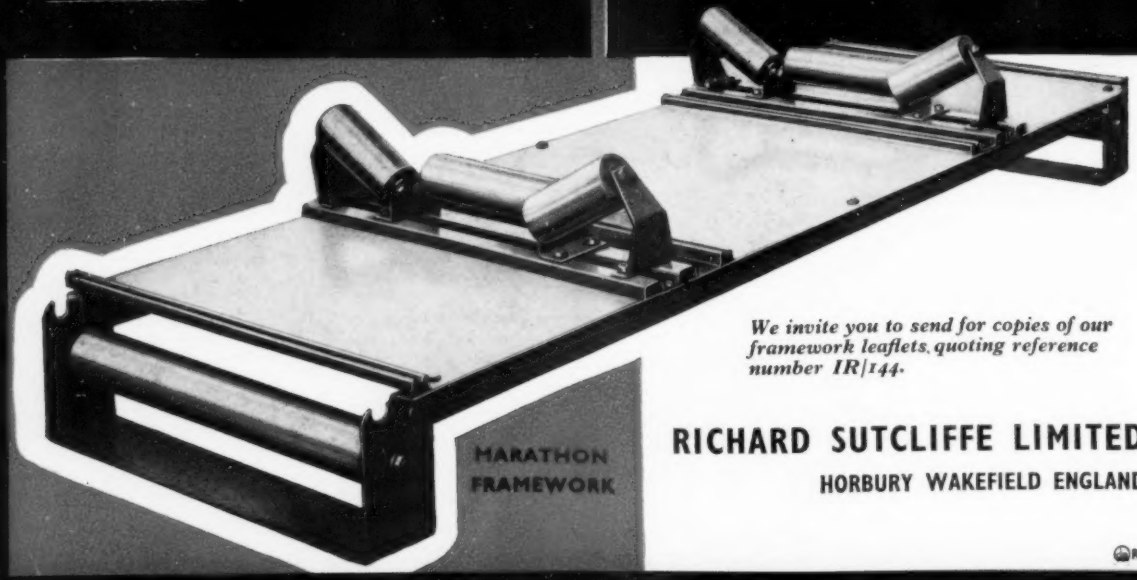
This range of conventional framework, introduced only two years ago, is now thoroughly established. Designed to give maximum strength with minimum weight, it is simple to erect and easy to maintain.

STANDARD FRAMEWORK

Over 1,000 miles of Sutcliffe standard framework have been installed in pits throughout the world during the past 50 years. It is strongly designed to ensure correct belt tracking under all load conditions.







We invite you to send for copies of our framework leaflets, quoting reference number IR/144.

RICHARD SUTCLIFFE LIMITED

HORBURY WAKEFIELD ENGLAND

RS144

and so a sinter plant is built

TODAY
The blast furnaces are consuming the full output of the sinter machine HH installed as part of the expansion programme at the Gartsherrie Works of Bairds & Scottish Steel Ltd.

TOMORROW
To cater for the future, the plant was designed so that a second sinter machine, although located away from the first strand, can receive raw materials from the same feed system.

ALWAYS
HH sinter plants are built to suit individual conditions so that every client obtains maximum benefit from progressive design. Precise control of the mix, the special forced draught cooler and a very adaptable stockyard arrangement are but three of the many specialities that make HH plants such economical producers of high quality sinter.

CONTINUOUS SINTERING PLANTS BY

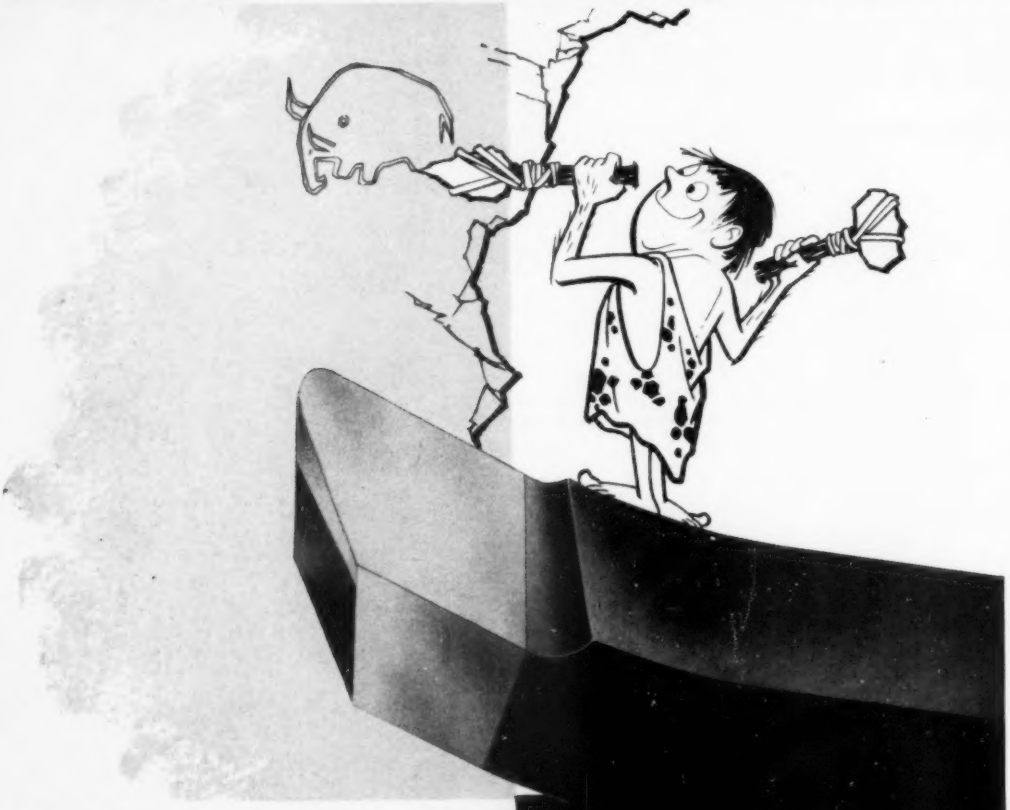
Huntington, Heberlein & Co. Ltd

SIMON HOUSE, 38-39 DOVER STREET, LONDON W.1.
Telephone: Hyde Park 8191 Telex: 2-3165
Telegrams: Innovation Wesphone London Telex

COMMONWEALTH REPRESENTATIVES:
Simon-Carves (Africa) (Pty) Ltd: Johannesburg Simon-Carves (Australia) Pty Ltd: Botany, N.S.W. Simon-Carves Ltd: Calcutta Simon-Carves of Canada Ltd: Toronto

HH 35/PS

A cutting end with lasting hardness



You get the exceptional cutting efficiency of Stag Major high speed steel in the form of a good substantial cutting end (not a tip) electrically fuse-butt-welded to a high grade steel shank. For little more than the cost of redressing you get a complete solid high speed steel tool hardened and ready for use on lathe, planer, shaper, etc. Please send for booklet and tool chart using the request form

EDGAR ALLEN & CO. LIMITED
IMPERIAL STEEL WORKS · SHEFFIELD 9

To EDGAR ALLEN & CO. LTD., SHEFFIELD 9
Please post "Superweld" booklet and chart to:-

NAME .....

POSITION .....

FIRM .....

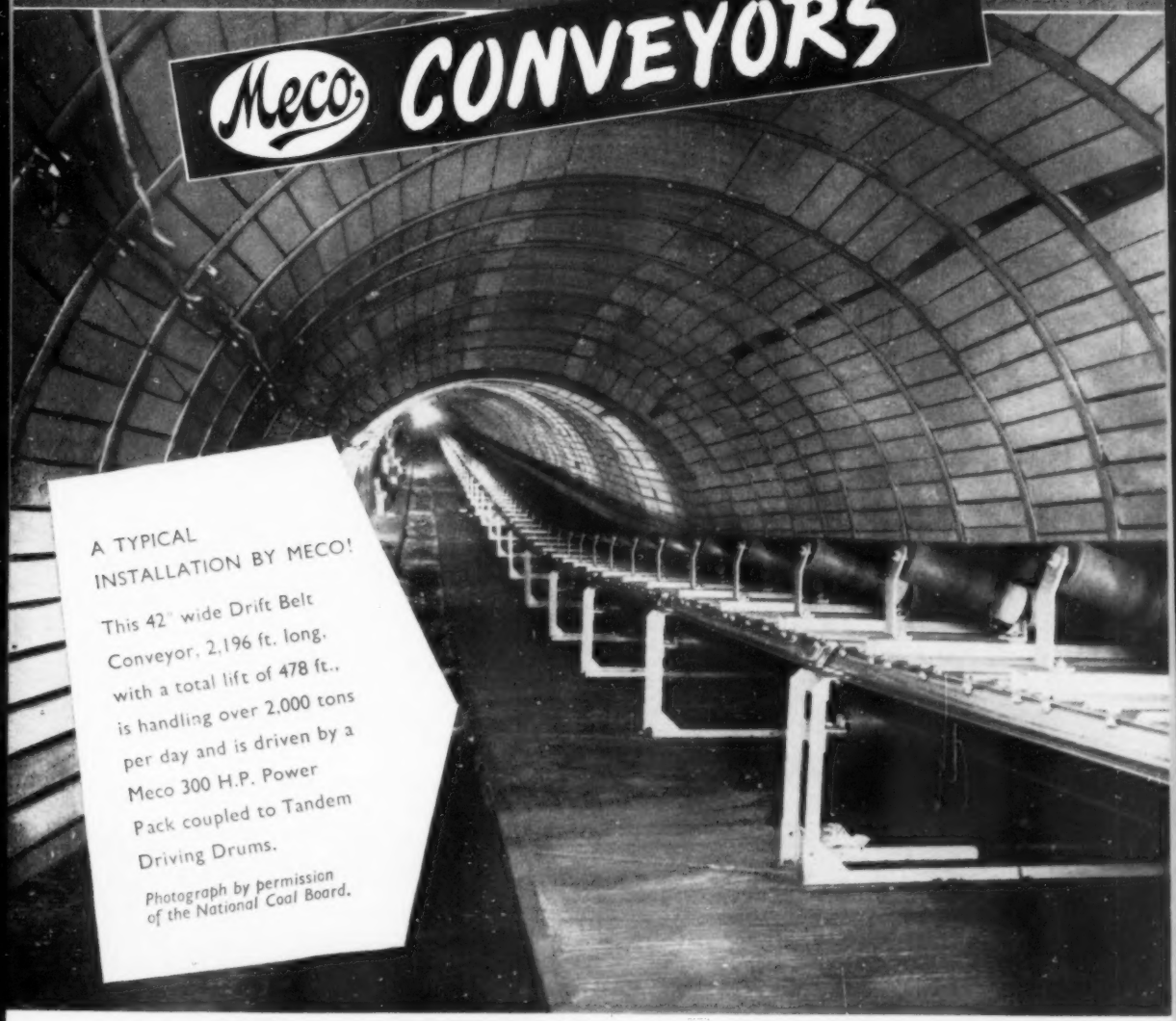
ADDRESS .....

ETD68ICTR

STAG MAJOR
SUPERWELD
TOOLS

NOW! MAJOR DRIFT TRANSPORT BY—

Meco CONVEYORS



A TYPICAL INSTALLATION BY MECO!

This 42" wide Drift Belt Conveyor, 2,196 ft. long, with a total lift of 478 ft., is handling over 2,000 tons per day and is driven by a Meco 300 H.P. Power Pack coupled to Tandem Driving Drums.

Photograph by permission of the National Coal Board.

THE MINING ENGINEERING CO. LTD.,
MECO WORKS, WORCESTER, ENGLAND.

Telephone: Worcester 22291 (7 lines).
Telegrams: MECO Worcester.
London Office: 50 Pall Mall, London, S.W.1.
Telephone: Trafalgar 4686/7.
Cablegrams: Mecomonde, Piccy, London.

L.P. 210—110

LINDLEY

MOBILE FIRE STATION

Made in four sections to facilitate conveyance to site. When erected it can be carried with ease by two men.

The storage bin is made to carry four or five lengths of fire hose, spare branch pipe and dividing breeching.

The whole structure is of robust design.

Supplied with or without equipment.

LINDLEY

HOSE CABINETS

TYPE 40 CABINET TO MEET CURRENT REGULATIONS.

To hold 5 lengths of Hose and Fittings. Finished Painted Red.

There are FORTY DIFFERENT DESIGNS made to meet ALL REQUIREMENTS.

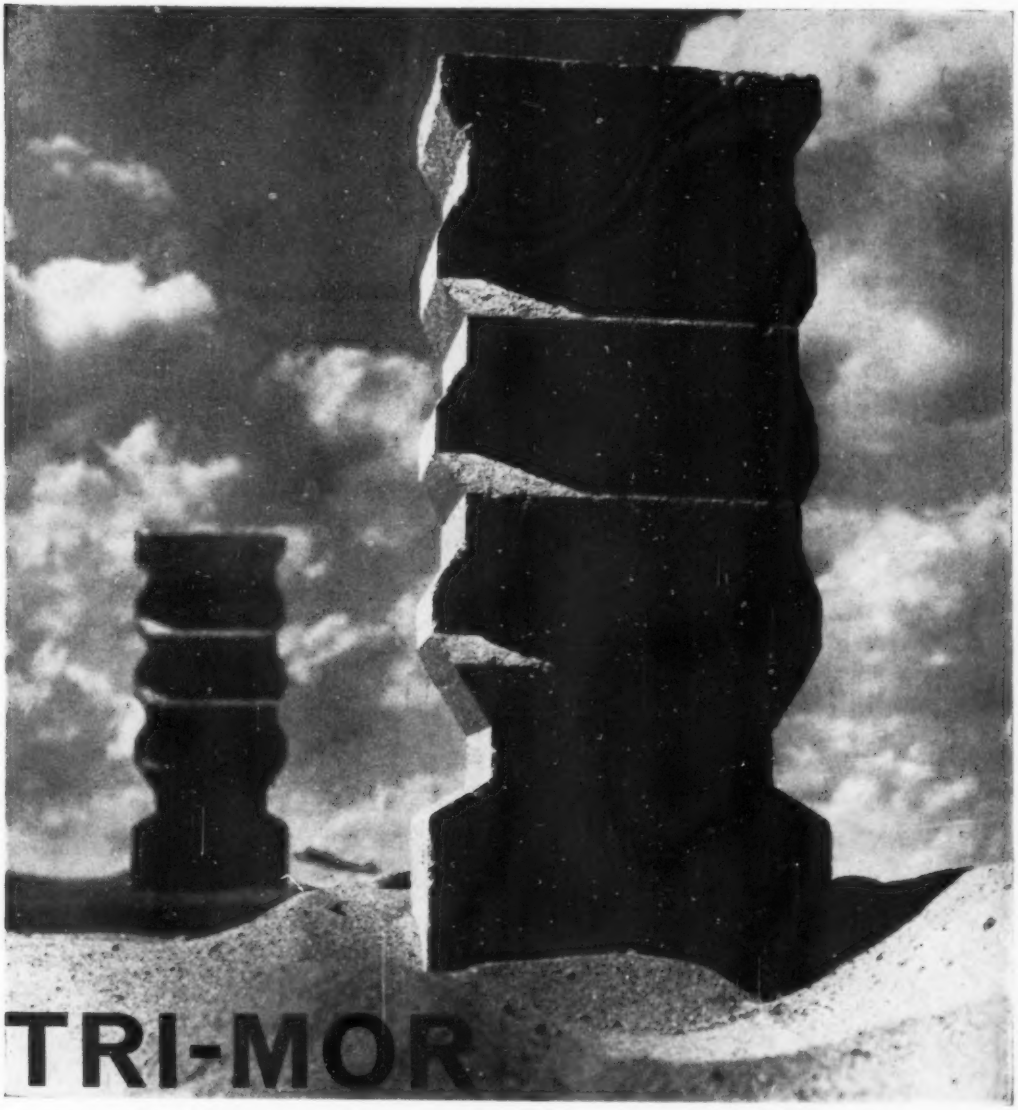
Details on request to:

H. LINDLEY LIMITED

DEANSTONES WORKS - DEANSTONES LANE

QUEENSBURY - Nr. BRADFORD

TELEPHONE: QUEENSBURY 2292/3.



mouldable and castable refractories made by...

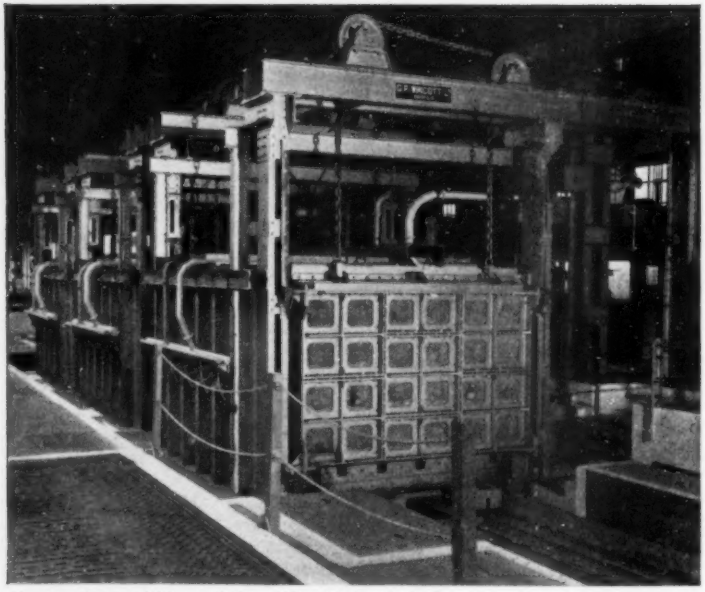
TRI-MOR HIGH TEMPERATURE MOULDABLE · TRI-MOR STANDARD MOULDABLE · TRI-MOR HIGH STRENGTH CASTABLE · TRI-MOR STANDARD CASTABLE · TRI-MOR 1500 CASTABLE · TRI-MOR HIGH TEMPERATURE CASTABLE · TRI-MOR 1800 CASTABLE · TRI-MOR INSULATING CASTABLE · TRI-MOR DENSE GUNCRETE

MORGAN Refractories Ltd

MORGAN REFRACTORIES LTD., NESTON, WIRRAL, CHESHIRE. TELEPHONE: NESTON 1406

NE 165A

Cut fuel and labour costs in your **Steel Foundry** and achieve continuity of production by installing a **Triple Chamber Quenching Furnace**



By permission of Messrs. Edgar Allen & Co. Ltd.

The three separate chambers of this City Gas Fired Furnace are 12′ 0″ long × 10′ 0″ in effective width. They are each equipped with two electrically operated self-locking doors and operate as independent units.

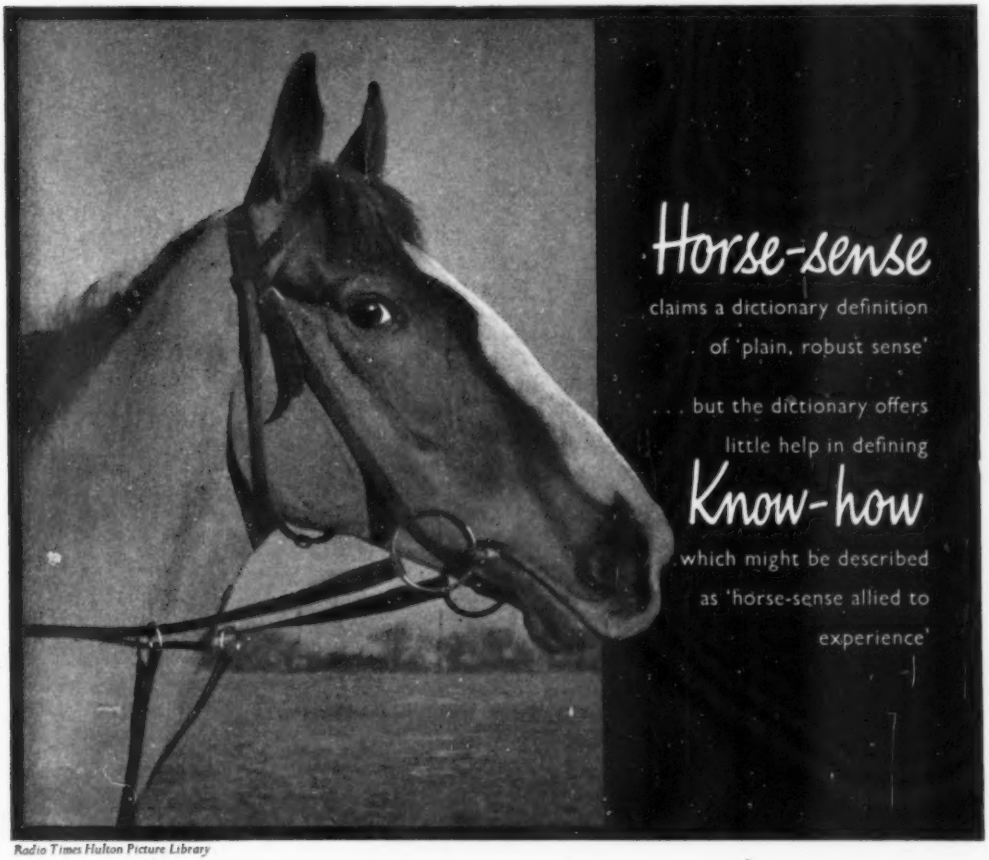
The castings are preheated from cold to 300°C. in the first chamber and then pass to the second chamber where they are raised to 750°C. They are finally heated to 1100°C. in the third chamber and after soaking are quickly withdrawn by an extractor gear and conveyed to the oil or water tanks for quenching. The chambers are equipped with instruments for the automatic control of temperature, air/gas ratio and pressure. Prescribed heating curves can easily be maintained.

By utilising the third chamber as a cooling chamber the furnace can be employed for annealing purposes. When desired the first and third chambers can be independently used for the batch treatment of castings.

Wincott
FURNACES

G. P. WINCOTT LIMITED, SHEFFIELD, ENGLAND.

TELEPHONE: 20211/2
TELEGRAMS: WINCOTT, SHEFFIELD



Radio Times Hulton Picture Library

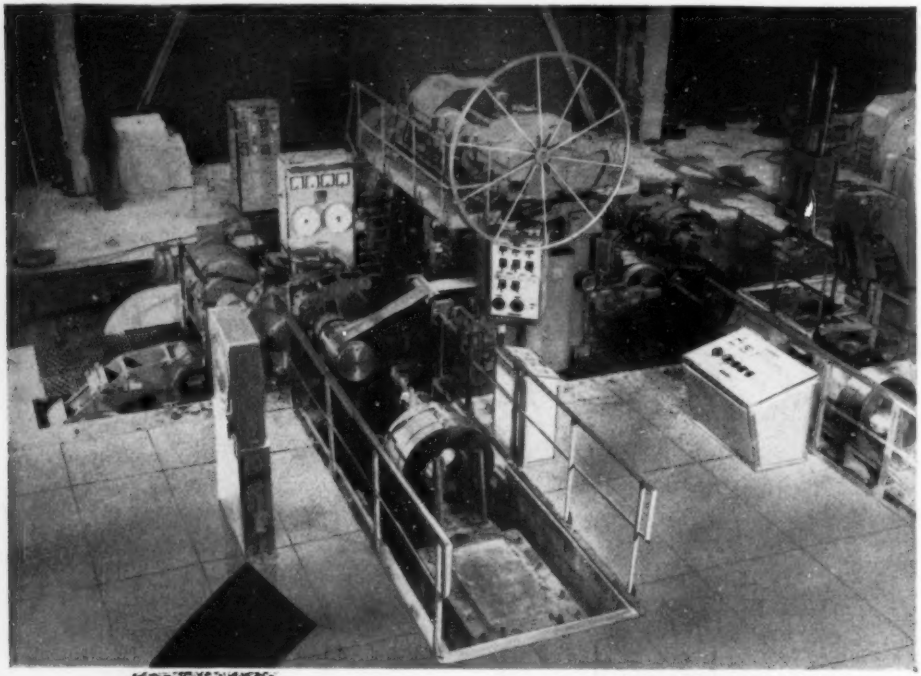
IN MORE THAN FIFTY YEARS

as manufacturers of **electric motor control gear,**
Allen West & Co Ltd have developed a
specialist 'know-how', backed by intensive
programmes of testing and research.

For all industrial, traction, and marine applications, the acknowledged symbol of service and reliability is

ALLEN WEST

ALLEN WEST & CO LTD BRIGHTON ENGLAND · Telephone: Brighton 66666 · Telegrams: Control, Brighton
Engineers and Manufacturers of Electric Motor Control Gear and Switchgear
SUBSIDIARY COMPANIES IN CANADA, SOUTH AFRICA AND RHODESIA · AGENCIES THROUGHOUT THE WORLD



"2 HIGH SKIN PASS MILL"
Photograph by courtesy of
Steel Peech & Tozer of Rotherham

FARMER NORTON

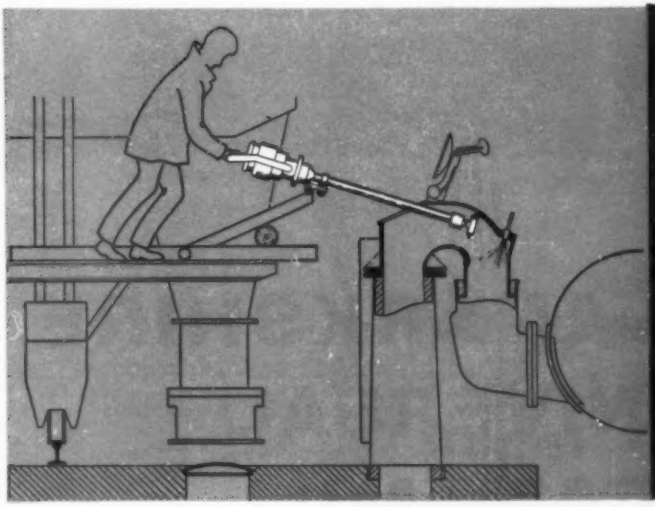
JFN

For Rolling Mills

& Auxiliary Plant

TEL. BLAckfriars 3613
Telex No. 66492.

SIR JAMES FARMER NORTON & CO. LTD., ADELPHI IRONWORKS, SALFORD 3, LANCS.



for easy cleaning of ascension pipes

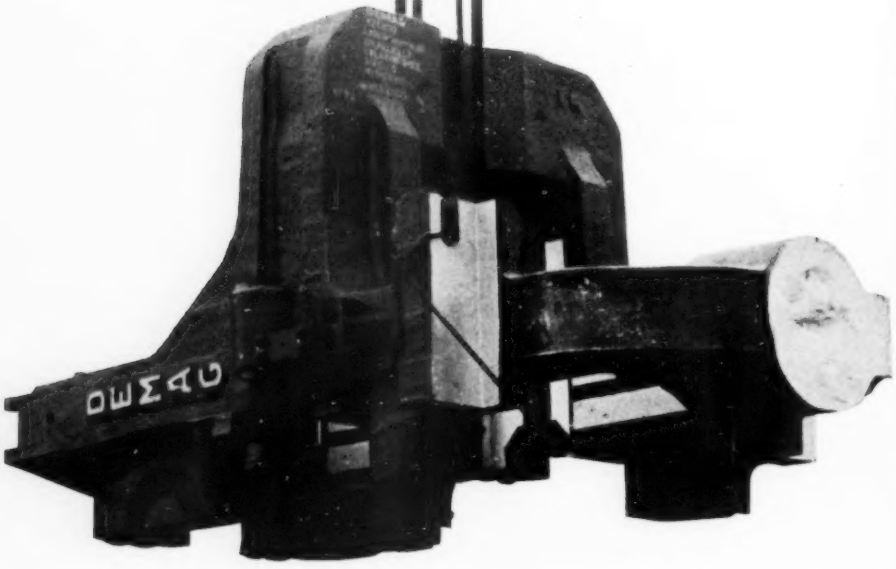
The **W-D FLAIL CLEANER** removes the drudgery from a coking plant chore.
Easy to use and efficient in operation— its regular use ensures clean ascension pipe bends.

The studded charging hole lids are lifted and replaced mechanically

U.K. Patent No. 854113

WOODALL-DUCKHAM
CONSTRUCTION COMPANY LTD
Woodall-Duckham House · 63-77 Brompton Road · London S.W.3
Phone KENsington 6355 · Grams Retortical (Southkens) London · Telex 21488
A MEMBER OF THE WOODALL-DUCKHAM GROUP OF COMPANIES

THE LANARKSHIRE UNIVERSAL BEAM MILL



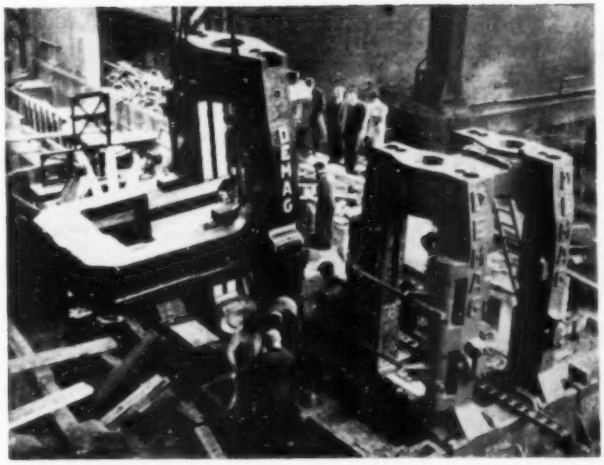
At Motherwell, the steel centre of Scotland, the Universal Beam Mill is at an advanced stage of construction.

When the new mill comes into operation the Lanarkshire Steel Company will be producing a wide range of Universal beams and columns for various structural uses in Britain and overseas.

The Lanarkshire Steel Co. Ltd.

MOTHERWELL SCOTLAND

One of the Colville Group of Companies



10 years ago

The first Cable Belt rope driven conveyor was installed

. . a recent installation is to the best of our knowledge

THE LONGEST BELT CONVEYOR IN THE WORLD with one driving unit.

Installed at Coal Cliff Colliery in New South Wales Australia this conveyor is almost

2½ MILES LONG!

distance no object with

CABLE BELT ROPE DRIVEN **CONVEYORS**

CABLE BELT ROPE DRIVEN CONVEYORS REGISTERED TRADE MARK

CABLE BELT LTD. LONGMAN INDUSTRIAL ESTATE, INVERNESS, SCOTLAND

Telephone: Inverness 2761-2 Telegrams: Cablebelt, Inverness

Agents in: AUSTRALIA; BENELUX COUNTRIES; CANADA; FINLAND; FRANCE; GERMANY; INDIA; JAPAN; NORWAY; SINGAPORE & MALAYA; SOUTH AFRICA; SPAIN; SWEDEN; U. S. A.

G

BRITISH STEEL AT ITS BEST

CARBONS UP TO 1.0%
DEEP STAMPING & RIMMING,
FREE CUTTING,
LEAD BEARING.

A MEMBER OF THE GKN GROUP OF COMPANIES

LYSAGHT'S SCUNTHORPE

LYSAGHT'S SCUNTHORPE WORKS
Branch of G.K.N. Steel Company Limited

NORMANBY PARK STEEL WORKS,
SCUNTHORPE, LINCOLNSHIRE.
Telephone: SCUNTHORPE 5271 (7 lines.)

6

Keeping up with the Jones's!

To keep up with the Jones's in crane design, construction and service, takes some doing. They are unbeatable. But when your load is on the hook of a Jones Crane, then 'keeping up' with the Jones's is child's play — simple and safe. And so is hoisting. And lowering. And luffing. And slewing. And manoeuvring in tight corners.

There is a vast range of Jones Cranes — mobile — rail — and lorry-mounted — lifts up to 20 tons — jibs to 120 feet.

Jones
cranes

3 years guarantee - Special credit facilities
Unequalled after-sales service - Part exchange scheme

THE 600 GROUP

Distributed in the United Kingdom by
GEORGE COHEN SONS & COMPANY LIMITED, Wood Lane, London, W.12

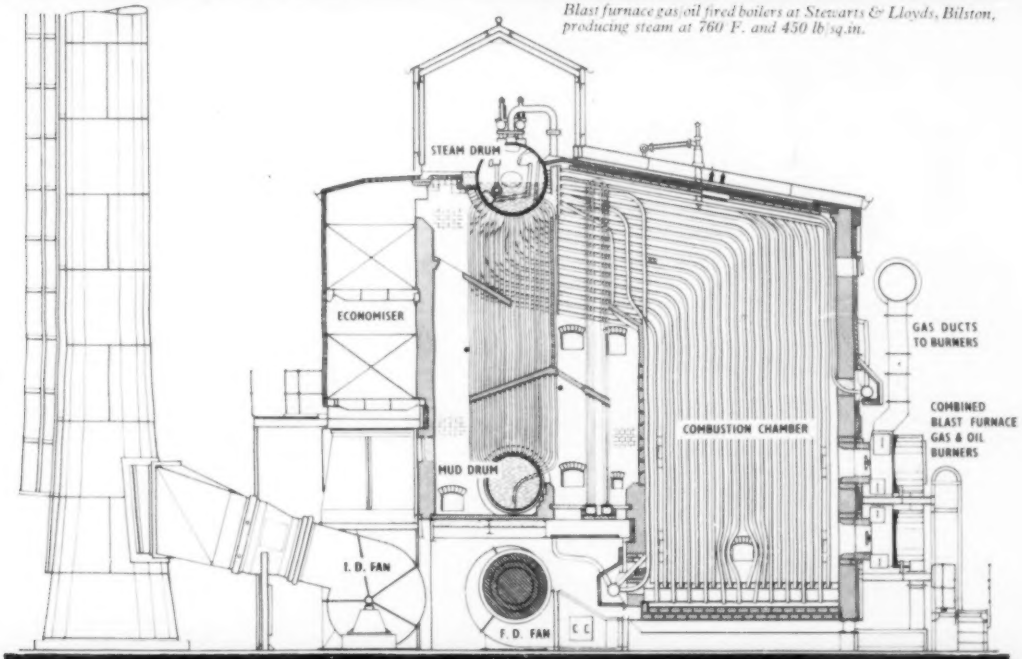
Designed, Manufactured and Exported by their Associates
K & L STEELFOUNDERS AND ENGINEERS LIMITED, Letchworth, Herts.

THE STEEL INDUSTRY AND JOHN THOMPSON

Great names in Steel, all using John Thompson Steam Generating Plant.

APPLEBY-FRODINGHAM, DORMAN LONG, FIRTH-VICKERS, SAMUEL FOX, GUEST KEEN & BALDWINS, STEEL COMPANY OF WALES, STEWARTS & LLOYDS, JOHN SUMMERS, RICHARD THOMAS & BALDWINS.

Blast furnace gas/oil fired boilers at Stewarts & Lloyds, Bilston, producing steam at 760° F. and 450 lb/sq.in.



John Thompson have supplied the Steel Industry with both natural and forced circulation water tube boilers fired with oil, blast furnace gas, coke breeze and coal; they have also installed a number of waste heat boilers, including forced circulation door frames on S.M.O.H. furnaces.

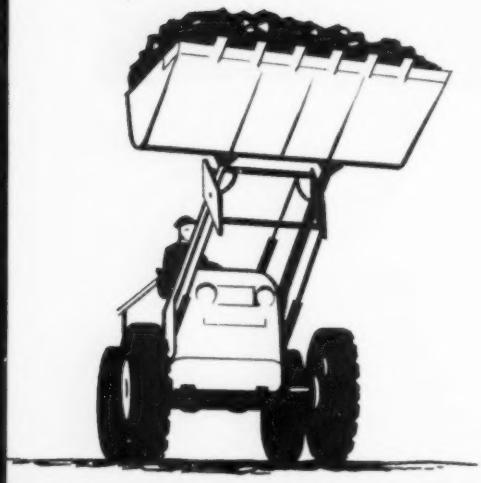
JOHN THOMPSON WATER TUBE BOILERS LTD. WOLVERHAMPTON

JOHN THOMPSON GROUP

WTB/14

The place

COAL HANDLING WITH THE **CASE W12** AT



Wherever there's a tough materials-handling job, that's the place for Case. Case offers you:

STABILITY Rear-mounted engine, low centre of gravity and extra-wide track to ensure complete stability at all times.

SAFETY Bucket arms pivoted ahead of the driver to give increased safety, visibility and reach.

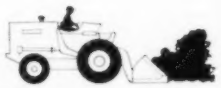
SERVICE Automatic free service at 50, 250, and 500 hours, regular free inspection and advice and a flying squad for emergencies to keep Case on the job.

Consider these advantages and you have—

the case for Case

FROM THE **CASE** RANGE THERE'S A TERRALOAD'R TO FIT YOUR NEEDS

Better balance
Faster cycles
Greater visibility



	TERRALOAD'R W12	TERRALOAD'R W9	TERRALOAD'R W5
BUCKET CAPACITY	$1\frac{5}{8}$—$3\frac{1}{2}$ CU YD	$1\frac{1}{4}$—$2\frac{1}{2}$ CU YD	1 and $1\frac{1}{2}$ CU YD
HORSE POWER	120	80	57
LIFT AT 0 MPH	15,000 LB	11,000 LB	4,500 LB
CARRY AT 4 MPH	9,000 LB	5,500 LB	3,000 LB
BREAKOUT FORCE	23,500 LB	13,500 LB	7,800 LB
MAX. SPEED MPH	24	23	23
FORWARD REACH (to tyres)	6 FT $3\frac{1}{2}$ IN	5 FT $2\frac{1}{2}$ IN	3 FT 0 IN

for CASE.

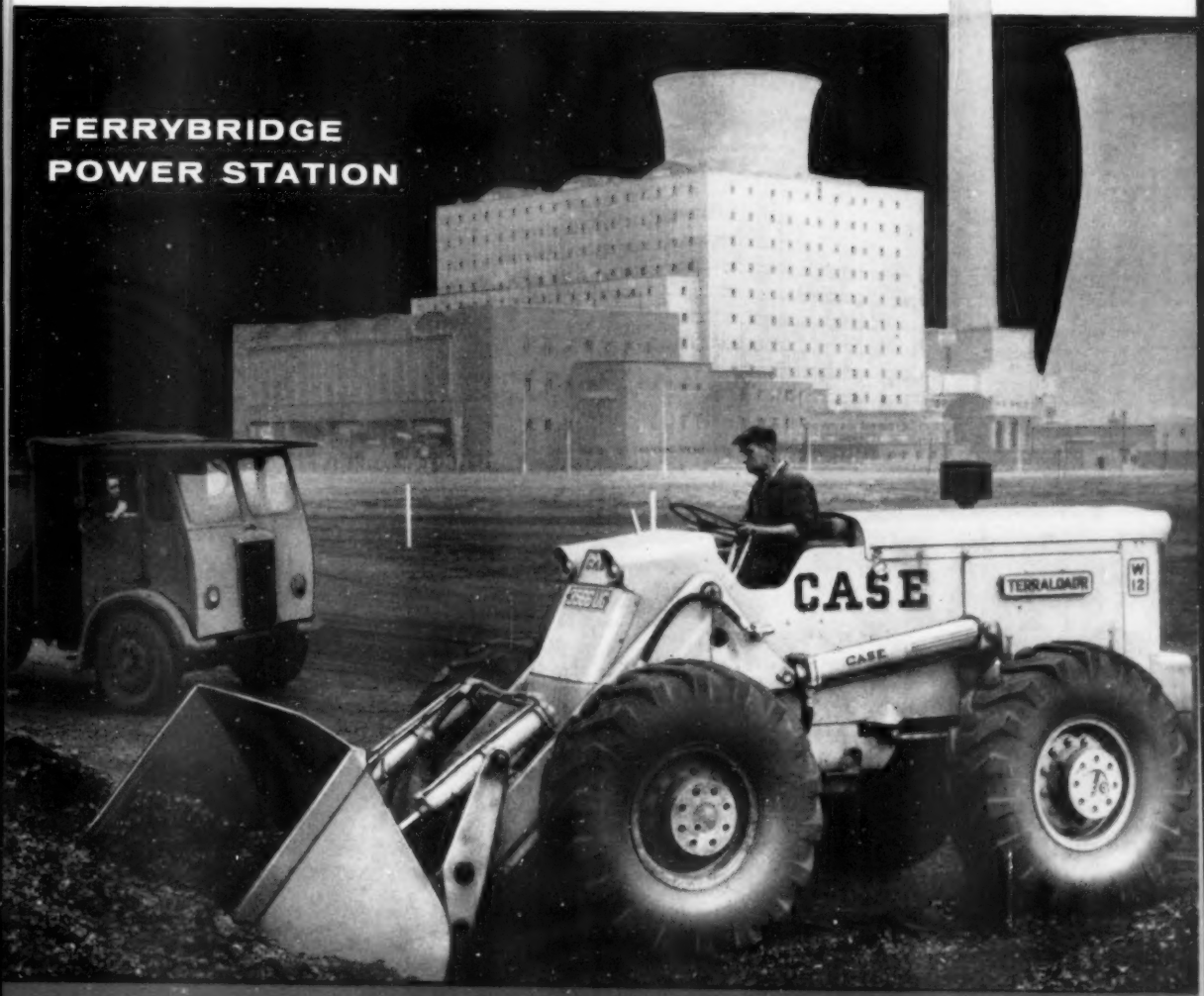


Photo: Courtesy Central Electricity Generating Board

CASE

J. I. CASE COMPANY LIMITED

West Drayton, Middlesex. West Drayton 3221. Stanningley, Leeds. Pudsey 77225

WORLD LEADERS IN EARTHMOVING TRACTOR DESIGN

Sole Distributors: Scotland—Scottish Plant Sales Ltd Wales—Wm. Lewis (Agricultural House) Ltd N Ireland—George Cohen Sons & Co Ltd

Salem for many years builders of modern multi-stack coil annealing plants now offer in collaboration with Messrs. Matthias Ludwig of Essen, the most up-to-date single stack coil annealing plants for both sheet and tin plate. More than 300 furnaces installed during the last 10 years.

Salem design, build and put into operation complete plant with all ancillaries.

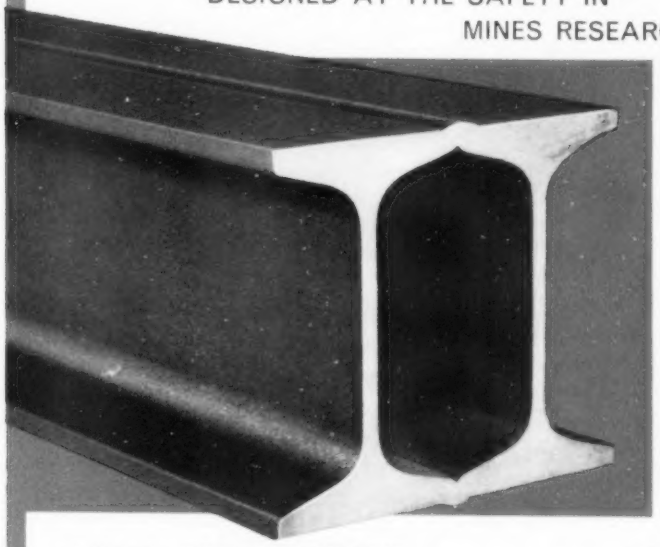
Salem ~ BROSIUS

MATTHIAS LUDWIG ESSEN
INDUSTRIEOFENBAU

SALEM-BROSIUS (ENGLAND) LIMITED MILFORD HOUSE · MILFORD Nr. DERBY · Phone: Duffield 2271 · Grams: Keaner "Belper"

P.5072

DESIGNED AT THE SAFETY IN
MINES RESEARCH ESTABLISHMENT



The New S.M.R.E. Roadhead Bar

TWICE THE STRENGTH . . .
FAR LONGER PIT-LIFE . . .
FAR GREATER SAFETY . . .
yet approximately the same weight and section as a standard R.S.J.!

The S.M.R.E. Roadhead Bar combines rigidity, stability and a high strength weight ratio and can be handled as easily as standard R.S.J.'s. The design enables the space between props to be considerably increased to suit the machine layout without risk of crippling the bar.

Two 'I' section R.S.J's to B.S. 968 are welded longitudinally, then hardened and tempered to give high tensile strength.

OFFICIAL UNDERGROUND TESTS

Results of long term trials throughout the country by the N.C.B have proved the life of the bar as being at least **10 times** that of a similar R.S.J.

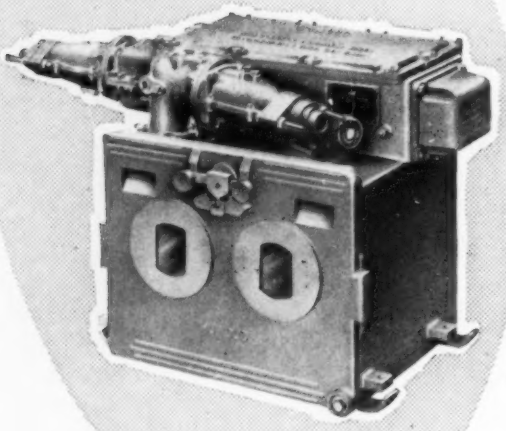
FULL PRODUCTION AUTHORISED

The S.M.R.E. Roadhead Bar is fully approved for underground use and is being manufactured by Joseph Wright & Co. (Fabrications) Ltd.

- 45 tons/sq. in. tensile strength
- 340 ton. in. transverse strength (3-point bend over 27½" centres)
- Weighs 16·5 lb. per ft.
- Heat treated steel to B.S. 968
- Low operational cost
- High resistance to lateral bending
- High resistance to twist and crushing
- 4¾" wide x 4" deep twin-web section.

AVAILABLE IN ANY LENGTH

JOSEPH WRIGHT & CO. (FABRICATIONS) **LIMITED**
PEAR TREE LANE,
DUDLEY
TELEPHONE : DUDLEY 52431



General view of Huwood Recording panel with B.I.C.C. flit plugs.

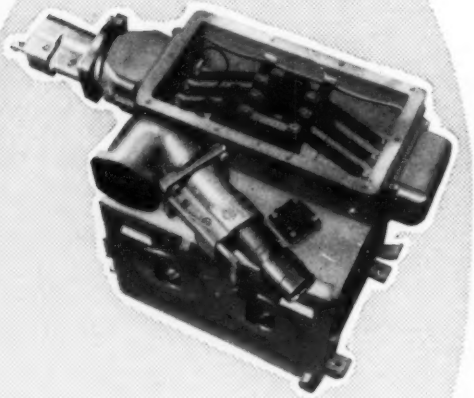
The HUWOOD FLAMEPROOF RECORDING PANEL Type HM12

The instruments most frequently supplied with the panel are a combination of ammeter, voltmeter and kilowatt meter controlled by a common drive and recording on separate charts, but the panel is suitable for power factor meter, frequency meter or integrating kilowatt hour meter.

FLP

A VERSATILE RECORDER

View of panel from above. Fitted with incoming and outgoing Huwood 100 plugs and sockets. Provision for direct reading voltmeter (or ammeter).



Can be used with pliable armoured cable fittings such as the Huwood 100 & 30 amp. plugs—Groups I & II.
. . . with B.I.C.C. flit plugs—Group I, or with Huwood cable box—Groups I & II.

This flameproof recorder is available for many different recording instrument arrangements, is rated for up to 200 amps. 650 volts, and can be banked both with any gate-end box to N.C.B. specification and with most switchgear prior to this specification.

HUGH WOOD & CO. LTD.

Head Office and Factories:
GATESHEAD - ON - TYNE, 11.
Telegrams: Huwood, Gateshead. Telephone: Low Fell 76081 (5 lines)

Industrial and Export Office:
ROYAL LONDON HOUSE, FINSBURY SQUARE, LONDON, E.C.2.
Telegrams: Huwood Stock, London. Telephone: Monarch 3273 (4 lines).

EE/FA/203

Vol. 182
No. 4848

IRON & COAL

THE IRON AND COAL TRADES' REVIEW

JUNE 16, 1961

ESTABLISHED 1866
Incorporating "STEEL and IRON" and "COAL"

Organ of the National Association of Colliery Managers and the Association of Colliery Managers in India

Published each Friday

Annual Subscriptions: United Kingdom....52s. Abroad....60s. Payable in advance.

Editor:
F. H. HARLEY

Assistant Editor:
P. E. CARDEN

Metallurgical Editor:
C. W. J. CRAWFORD, A.I.M.

Mining Editor:
H. COOPER, A.M.I.MIN.E.

News Editor:
R. M. HOWSE

Associate Editors:
J. J. CALEY and B. M. DAVEY

District Representatives:

E. G. COLLIS (Southern) Tel.: TRAfalgar 6171

A. D. H. CURRIE (Northern) Tel.: Ringway 2452

E. J. SWEETING (Midlands) Tel.: Plumtree 2585

T. H. SMITH (Scotland and N.-E. England) Tel.: Dumbarton 1046

Production Manager:
R. J. LOVELL

Publisher:
H. J. DWYER

Circulation Manager:
E. T. GRIFFITHS

AN INDUSTRIAL NEWSPAPERS PUBLICATION

Published by
INDUSTRIAL NEWSPAPERS (FUEL & METALLURGICAL), LTD.

Directors:
F. BARRINGTON HOOPER *Managing Director*
F. H. HARLEY
JOHN HOOPER
V. C. FAULKNER
E. G. WESTON, *Secretary*

JOHN ADAM HOUSE, 17-19, JOHN ADAM STREET, ADELPHI, LONDON, W.C.2

Telephone: Trafalgar 6171 (Private Branch Exchange)
Telegraphic Address: "Zacatecas, Rand, London."

In this Issue—

NACM ANNUAL CONFERENCE
Highlights of the Edinburgh Meeting - - - page 1275

EFFICIENCY IN COAL MINING
Mr. Robens Addresses NACM Conference - - page 1283

RATE OF SLAG FORMATION
Practical Factors Affecting It - - - - page 1287

FILIGREE REINFORCEMENT GIRDERS
Use in Floor Construction - - - - - page 1292

UNDERGROUND STOWING & DIRT BUNKERING
Installation at Holditch Colliery - - - - page 1295

	PAGE
Leading Article: Price of Coal	1265
March Rise of £1,000,000 in Machine-tool Orders	1265
Passing Thoughts	1266
New Construction Equipment Exhibition at Crystal Palace	1266
Steel Output	1267
No Inquiry Into Dispute at John Summers	1267
New Management Posts in East Midlands NCB	1268
Appointments	1268
"Mining Electricals" Confer	1269
Minister Urges Shipyards to End "Record of Strife"	1270
Wages Compensation Plan by Steel, Peech & Tozer	1270
Mr. B. M. Swift Heads AEI New After-service Depot	1270
Birthday Honours	1271
Cranemakers Welcome Overseas Delegates	1273
Orders Placed	1274
Aid for India's Coal Industry	1282
A New Gummer Bar	1282
Book Review	1285
Forthcoming Events	1285
New Grading System for Metal Sheets	1286
Huge Forging Hammer at Westinghouse Electric	1294
For Samuel Fox's Extension Scheme	1294
GEC High-pressure Brake Engines for Africa	1301
Calculating Rock-bolt Requirements	1301
New Literature	1302
Indian Steel Plants Nearing Completion	1303
Conference on "Hydrogen in Steel"	1303
Correspondence	1303
Process Control for Tinplate	1304
Tasmanian Iron-ore Deposit	1305
Low-temperature Heat Treatment of Spring Wires	1306
"Heat Bibliography, 1959"	1306
Obituary	1307
BEAMA Director on Dangers of Price Warfare	1307
Personal	1308
Iron and Steel Trade	1309
SCOW'S Reduced Earnings for Half-year	1309
Ore Chartering	1309
Coalfield News	1310
Miners Discuss Coal Imports with Minister	1310
The Coal Trade	1311
More Coal in Stock	1311
Increasing World Use of Zinc for Galvanizing	1312
In Parliament	1312
Company News	1313
G. & J. Weir's Trading Position "Difficult"	1314
News in Brief	1315
Board Changes	1316
Mr. Robens' Confidence is Growing	1316
Miners Warn Again on "Decentralization"	1318
More Pay for Yorkshire Pit Officials	1318
ECSC Coal Output Down on Last Year	1318
Coal Chartering	1320

"Yes, there are other electrodes"...

..."but I prefer to rely on Murex"

"And you can't beat 'Fastex 5' for quickness and quality"

..."It's easily the best general purpose electrode available."

"Fastex 5" is easily the best general purpose electrode available because it is fast in operation and produces neat and regular welds; it is smooth running and produces slag which is easy to remove; its high quality is consistent; it is designed for downhand welding, and it can be used in other positions; it is suitable for an extensive range of general purpose work and for a wide variety of mild steels. In short "Fastex 5" is the best electrode for most jobs.

MUREX

"FASTEX 5"

MUREX WELDING PROCESSES LTD., WALTHAM CROSS, HERTS

T38/573

IRON & COAL
THE IRON AND COAL TRADES REVIEW

Vol. 182 June 16, 1961 No. 4,848

Price of Coal

MANUFACTURERS and producers can charge for their goods and products only such prices as the market will stand. If the consumer decides that the price he is asked to pay is too high he will seek another seller or an alternative product. In the case of coal, the consumer cannot look for another seller, for the National Coal Board is a monopoly producer, but he can seek other fuels, and he has been doing so increasingly in recent years. The importance of price as a determining factor in relation to coal sales has never been more clearly stated than at Edinburgh last week, when the chairman of the National Coal Board, having voiced the simple philosophy that it was of no use producing coal unless it could be sold commercially at a profit, told his colliery manager audience that it was "absolutely essential" in the present circumstances of the industry to ensure price stability.

The consumer's fear of rising prices Mr. Robens described as the greatest threat to the future of the coal industry. He was talking particularly of the big steam raisers, and specifically of plant owners who are contemplating turning over to the use of oil. Properly burnt in modern steam-raising installations coal can hold its own with oil, but it would be stupid to assume that price is not a prime factor. For a plant owner to weigh the economics of oil versus coal is plain business sense. It behoves every manufacturer to have regard to his costs. "More heat at less cost" is a good slogan for solid-fuel interests to use in their sales campaigns, but the fuel buyer needs more than a slogan to make him hand his money over the counter—he needs proof. The sales-technologists now working on behalf of coal all over the country are proving their worth. Their efforts would be greatly helped if they could carry the offer of lower prices in their travelling bags; they would be hamstrung in their endeavours if even a hint of dearer coal crept into their sales talk.

Mr. Robens made clear enough the awareness of the National Coal Board of the disastrous results on the fortunes of the industry which would accrue if the price of coal were raised again. Hence his emphasis on the vital necessity of price stability and his insistence that the fear of an increase is effecting coal sales today. Consumers must be convinced not only of the NCB's intention to keep prices stable, but also of its ability to do so. There can be no doubt about the board's intention, and Mr. Robens was clear enough in stating its determination. He was equally explicit about how price stability is to be achieved. It can only be done by keeping down real costs. The NCB chairman seems resigned to the belief that the costs of materials will go up. He said that the industry must try to improve the rewards to those who served it—men, management, and administrators. Coal mining was not a highly paid industry, he affirmed. But all increased costs must be paid for by constantly rising productivity. Mr. Robens was emphatic that productive efficiency could be further improved—provided men and management realize the need, and the necessary co-operation is forthcoming. This is surely a challenge which managers and miners will accept. The board wants to get the industry in a position which will enable its marketing men to write long-term contracts. "That is the only way to convince the big buyers that we mean what we say," said Mr. Robens. He believes that the industry has the capacity so to organize its affairs, to raise its productivity, and improve its product that it is able to secure the price stability that means orders for coal. To achieve this he wants new effort and enthusiastic support from all who get their living from coal. The prize is worth going for; failure inevitably means a further contraction of the industry on which they and the community as a whole so much depend.

March Rise of £1,000,000 in Machine-tool Orders

WITH new orders for machine tools in March again exceeding deliveries, the industry's order-book increased to £110,400,000, about £1,000,000 more than the figures for January and February, and over 50 per cent. higher than the order-book for March, 1960, according to figures issued by the Machine Tool Trades Association. Net new orders during the month, at £11,700,000, were, however, 32 per cent. less than in March, 1960, and over the first three months of this year new orders were 16 per cent. less than the high figures reached in the corresponding period a year ago.

The increase in the March order-book, compared with February, was mainly accounted for by a rise in home orders, which rose from £84,600,000 to £85,500,000. Export orders remained about the same at £24,800,000. The increase in the order-book took place despite a rise in deliveries of machine tools, which in March were £10,600,000, nearly 18 per cent. higher than in February.

CERTIFICATES AND GIFTS in recognition of long service were presented at a dinner held recently by Garringtons, Limited, drop, press, and upset forgers, of Darlaston and Bromsgrove. Over 40 years' service by Mr. J. Spellman, who has done almost every job in the forge from stamper to shop foreman, and Mr. J. C. Beech, director and general manager, were acknowledged.

Passing Thoughts . . .

I SUSPECT that most of you, like me, ask for nothing better than to be allowed to run your respective businesses in peace and without too much regard for wider issues. It happens, however, that we no longer live in the kind of world that makes this possible and if we are to continue in business as useful members of society we must adapt ourselves to the changing conditions of the times.—MR. C. E. HARRISON in his first speech since his election as president of the Federation of British Industries.

Why all the uncertainty as to whether the American or British coal is cheaper? An analysis of fair samples would prove the answer.—Letter in the Sheffield Telegraph.

I have spent virtually all my life in coal. I know the people in it. I rely confidently on the resourcefulness of those whose job it is to run the industry; on their high sense of responsibility; on the professional standards of our engineers and on the integrity of management of the collieries; and on the determination of all of us to make coal mining a secure and successful undertaking.—MR. E. H. BROWNE, deputy chairman of the National Coal Board, addressing the National Association of Colliery Managers.

There are, of course, some differences between Eton and a mining village, perhaps not all in favour of the former.—Daily Telegraph.

Until coal has emerged from its latest financial morass, and as long as it is expected to run economic and social objectives in tandem, the industry might reasonably expect its protection to remain unviolated either by imports of methane or by imports of American coal. But mounting pressure for these cheaper sources of fuel may not be irresistible.—The Economist.

It is plain that the coal industry and its workers will not enjoy assured security and prosperity unless and until coal prices are stabilized, and at lower, not higher, levels.—The Journal, Newcastle-upon-Tyne.

If the pattern of generation envisaged today is followed, the heaviest concentration of power stations in 15 to 20 years' time will be in the central coalfields.—SIR CHRISTOPHER HINTON, chairman of the Central Electricity Generating Board, speaking at the 13th British Electrical Power Convention.

It is imperative that management and men [in the coal industry] so act that they do not alienate public opinion. If they do, what chance have they of getting support for any plea for a national fuel policy?—The Scotsman.

I am growing heartily sick of the publicity which is being given to British firms who fail to maintain delivery promises. They deserve all they get, but it is high time something was said about those who do not let their customers down and who are worthy of some consideration on that account.—MR. R. S. REDMOND, managing director, Heyes & Company, Limited, manufacturing electrical engineers, of Wigan, in a letter to the Financial Times.

Gone are the days of the "pure" accident. Accidents are caused, and can be prevented.—DR. WILLIAM REID, *chairman of the Durham Divisional Coal Board.*

If modern colliery electrical equipment is to be run and maintained in not only a safe condition (which is the first essential) but in a condition which will satisfy the owner and justify its existence as an economical aid to mining, the day of the engineer who has only a little knowledge of electrical machinery has gone, and the sooner he realizes the fact, the better—not only for himself, but for all those associated with its use.—The late MR. ALEXANDER ANDERSON, father of the present president, in his presidential address to the Association of Mining Electrical and Mechanical Engineers in 1913, quoted by his son, Mr. James Anderson, in his presidential address to the association last week.

New Construction Equipment Exhibition at Crystal Palace

OVER 170 exhibitors are displaying equipment ranging from the smallest hand mechanical power tools to the largest earth-moving machinery at the new International Construction Equipment Exhibition at Crystal Palace, which was opened yesterday (Thursday) by Mr. Reginald Maudling, President of the Board of Trade. The exhibition will continue until June 24.

The display area is well over 250,000 sq. ft. and in addition, two proving grounds, covering 180,000 sq. ft., have been specially reserved for demonstrating machinery and equipment in action under normal working conditions.

Represented among the exhibitors are some 50 companies from Belgium, France, Holland, Italy, Sweden, Switzerland, the US, and West Germany. Arrangements have been made for the reception of oversea visitors and a corp of interpreters, speaking 15 languages, will be on permanent call.

Preparation of the site for the exhibition has been a major operation involving the complete demolition of the old high-level station to provide accommodation for 1,500 cars, the removal of 5,000 tons of earth, and the erection of two 300-ft. Bailey bridges and three 85-ft. towers.

SCOW to Appeal Against Port Talbot Works' Assessment

RATING of large industrial premises is now the concern of two local authorities in South Wales—Port Talbot Borough Council and Glamorgan County Council. The county council's finance committee was told on Tuesday that if the appeal lodged by the Steel Company of Wales against the rating assessment of its Port Talbot Works succeeds the authorities could lose £390,000 in rateable value.

The borough council is to oppose the company's appeal and is to brief counsel to represent it.

"CLEARCALL" communication equipment valued at £120,000 is to be supplied by the electronic apparatus division of Associated Electrical Industries, Limited, for use throughout the Spencer Steelworks, Newport (Mon), of Richard. Thomas & Baldwins, Limited. The first equipment will be commissioned in the materials handling plant in August, and will be followed by the blast furnace telegraph and direct wire system.

STEEL OUTPUT

Orders Below Rate of Deliveries

USE of about 87 per cent. of the steel production capacity available, compared with 95 per cent. based on a smaller potential at this time last year, is revealed by the steel output figures for last month, published by the Iron and Steel Board yesterday (Thursday). At an average rate of 466,100 tons a week, steel production compared with 471,600 tons a week during April and with 475,400 tons a week in May, 1960. Allowing for the effect of the Whitsun holiday, which fell in May this year but not in 1960, output last month was at about the same level as a year ago.

For several months, the Iron and Steel Board states, orders received by the steel producers from the home users have been running below the rate of deliveries. Order-books have shortened and most products are now available with early delivery.

The use of steel is being maintained by the continuing activity in the building, industrial plant, and general engineering trades, together with some revival in the motor industry. Orders and deliveries, however, can be substantially affected by movements in stocks of steel.

Latest pig-iron and steel output figures (in tons), with the corresponding 1960 returns, are shown in the following table:—

Period.	Pig-iron.		Steel ingots and castings.	
	Weekly average.	Annual rate.	Weekly average.	Annual rate.
1961—March ..	313,500	16,301,000	471,000	24,490,000
April ..	308,400	16,035,000	471,600	24,521,000
May ..	300,200	15,610,000	466,100	24,240,000
1960—March ..	312,300	16,238,000	485,100	25,226,000
April ..	310,600	16,150,000	478,100	24,861,000
May ..	299,100	15,554,000	475,400	24,723,000

Steel Board Chairman's Salary

IN a statement by the Minister of Power, Mr. Richard Wood, in the House of Commons on Wednesday, it was revealed that the salary of Sir Cyril Musgrave, chairman of the Iron and Steel Board, who is to hold the office on a part-time basis from July 1, will be reduced from £8,500 to £6,000.

An official of the board explained that Sir Cyril, who is nearing his 61st birthday, will work full-time when there is pressure of business, but expects to average about four days a week at the office. The change in no way indicates a lessening in the board's activities.

Sir Archibald Forbes, who was chairman of the board from its establishment under the Iron and Steel Act, 1953, until 1959, also worked on a part-time basis for about a year before he retired from the office. Sir Robert Shone, the executive member, is now the only full-time member of the board.

CONTRACT FOR 50 outdoor type oil circuit breakers for the North Ireland Electricity Board has been awarded to South Wales, Switchgear, Limited.

No Inquiry into Dispute at John Summers

REQUEST for a committee of investigation into the dispute which recently threatened to close the steelworks of John Summers & Sons, Limited, at Shotton (Ches), has been turned down by the Minister of Labour, and as a result, unless employers and unions can reach an early agreement, further trouble may develop at the plant.

When local union officials tried to call the craftsmen out on strike at the end of last month the men protested and decided instead to continue to work, if an inquiry into the dispute was held within three weeks. The management agreed, but the Minister has now told the Iron and Steel Employers' Association, who forwarded the request to him, that he considers the matter appropriate for settlement within the industry's negotiating procedure.

Questions in the House of Commons on the dispute are to be put next week by Mr. Frederick Lee, Labour MP for Newton-le-Willows, who will ask what reply has been sent by Mr. Hare to the Iron and Steel Trades Employers' Association.

Big Order for G.W.B. Furnaces

ORDER for what is stated will be the largest and most powerful high frequency induction melting furnace in the UK has been placed with G.W.B. Furnaces, Limited, Dudley (Worcs), by the North Eastern Iron Refining Company, Limited, Stillington, Stockton-on-Tees. It will be used for the production of highly specialized refined alloy pig-irons and steel. The first furnace body will have a capacity of up to seven tons of molten metal but the electrical equipment has been so designed that a second furnace body may have a capacity of just over 10 tons. The plant will be housed in the main cupola melting shop to allow for duplexing operations and machine casting.

The Stillington installation will comprise a 1,700 kW high-frequency generating plant working in conjunction with a bank of water-cooled capacitors. A motorized 10,000-amp furnace selector switch is also to be supplied to enable the high frequency power to be switched to either of two furnaces. The equipment, which will be engineered and built to an approved design of Demag Elektrometallurgie, is expected to be commissioned in December this year.

New Management Posts in East Midlands NCB

DEPUTY production manager (operations) in No. 7 (Coleorton) Area, East Midlands Divisional Coal Board, since 1957, Mr. L. J. Mills becomes production manager in that Area on July 1 in succession to Mr. H. E. Bennett, who has been appointed general manager in No. 4 (Huthwaite) Area.

MR. L. J. MILLS

Mr. Mills, who is president of the South Midlands branch of the National Association of Colliery Managers, was educated at Portsmouth Grammar School and Birmingham University, and was an overman with Houghton Main Colliery Company, Limited, Yorkshire, before nationalization. Later he went to Hemsworth Colliery, first as assistant manager and then as manager. In 1951 he became agent for Frickley and South Elmsall collieries, and in 1954 went to No. 3 (Edwinstowe) Area, East Midlands Division, as deputy production manager (reconstruction and development).

Mr. F. D. Davies, deputy production manager (operations) in the No. 5 (Eastwood) Area since 1956, has been appointed production manager of that Area, succeeding Mr. C. V. Peake, who recently became an Area general manager in the North-Eastern Division. Educated at Chelmsford Mining Technical School, Dinnington (Yorks), and Sheffield University, he started in mining in 1938 at Dinnington. In 1945 he became assistant manager at Wath Main, and later was an engineer with the Safety in Mines Research Board. He also held appointments as mechanization engineer in North-Eastern Division's No. 1 Area, and as manager of Thurcroft Main and Brookhouse collieries before going to No. 5 (Eastwood) Area of East Midlands Division as sub-Area manager in 1954.

Mr. Davies is junior vice-president of the Midlands branch of the NACM, which he represents on the NACM national council.

Rise in Productivity in West Midlands NCB

IN the West Midlands Division of the NCB during May, coal-face productivity was higher by 8 per cent. and overall output per manshift by 4½ per cent. than in May last year. In the Cannock Chase Area, coal-face productivity was up by nearly 16 cwt. per manshift, and in North Staffordshire Area by more than half a ton. Total saleable output during May was 1,049,000 tons—2½ per cent. less than in May last year.

Coal-face productivity in the division in the first 21 weeks of this year was more than 5 per cent. higher than in the same period last year, and overall output per manshift rose by 4.7 per cent.

Appointments

Mr. J. HAYWARD has been appointed public relations officer of the General Electric Company, Limited.

Mr. E. S. PITCHER has been appointed sales manager for the London and home counties area for C. H. Johnson (Machinery), Limited, Stockport.

Mr. A. J. MATTHEWS has been appointed area sales manager for Hampshire, Dorset, and Wiltshire for Fry's (London), Limited, engineers' tool manufacturers of Crawley (Sussex).

Mr. NORMAN THOMPSON, who has been with the company for 23 years, has been appointed group executive consultant (electrical engineering) of Richard Thomas & Baldwins, Limited.

Romac Industries, Limited, has appointed Mr. D. H. BARRATT as home sales manager. He joined the company in 1954 as northern divisional manager and for the past three years has been field sales manager.

The British Iron and Steel Research Association has appointed Mr. BASIL H. TRIPP as editor of its internal and external publications concerned with research work in the steel industry. Mr. Tripp has, since 1952, been press and publications officer of the Joint Iron Council.

Mr. A. H. H. YOUNG has joined Crompton Parkinson, Limited, as general manager at the Derby works. He will be responsible there to Mr. R. F. D. Milner who has relinquished his position as general manager while retaining his responsibility as managing director of Derby Cables, Limited. Before joining Crompton Parkinson, Mr. Young was works manager at the Associated Electrical Industries, Limited, cable plant at Lydbrook.

Mr. C. S. JOHNSON, manager of the Farington foundry of Leyland Motors, Limited, for the last four years, has now been appointed chief metallurgist of the company. Mr. Johnson received his early training with Hepworth & Grandage, Limited, Bradford, and joined the Leyland group in 1946 as chief metallurgist of West Yorkshire Foundries, Limited, Leeds. In 1951 he was awarded a silver medal of the Institute of Production Engineers for a paper entitled "Modern Foundry Practice" and in 1952 was appointed chief inspector of the Leyland headquarters group of factories. Mr. J. FERGUSON, foundry production manager of Leyland's Farington foundry for the past two years, succeeds Mr. Johnson, and Mr. L. J. MURRAY, superintendent of the Farington engine factory, has been appointed works manager of the Chorley works.

Diminishing Tyne Coal Trade

RETIRING chairman of the Tyne Improvement Commission, Mr. A. G. Everett, said recently at the annual meeting that the coal trade, on which the commission relied for most of its revenue, had diminished since 1950, and further reductions from this source, which it may have to face, would be a serious matter.

The question of replacing the ore-discharging cranes at Tyne Dock, so that they could deal more efficiently with the larger ships, was being investigated, stated Mr. Everett. Mr. C. B. Garrick, deputy chairman of the commission, has succeeded Mr. Everett as chairman and the new deputy chairman is Mr. J. N. Burrell.

OVER 40 COAL WAGONS ran away for more than a mile between Blaencwm and Treherbert, Rhondda, on Wednesday, before being diverted into a siding where they smashed into eight empty coaches.

"Mining Electricals" Confer

MAINTENANCE OF UNDERGROUND MACHINERY

ALTHOUGH there was plenty of " meat " for the more sober and technically minded in the 1961 convention of the Association of Mining Electrical and Mechanical Engineers, the convention committee and the borough of Harrogate made sure that not only was there plenty to do and see but that it could be done and seen in the most pleasing and comfortable circumstances. Either the committee or the borough obligingly enabled " French Week " in the town to coincide with the convention, and chance added four days of sunshine.

Both in his presidential address at the annual meeting and at the concluding event of the convention—the annual banquet—the president, Mr. James Anderson, chairman and managing director of Anderson, Boyes & Company, Limited, makers of coal cutters, power loaders, mining type switchgear, etc., of Motherwell (Lanarkshire), made reference to the presidency of his father, the late Mr. Alexander Anderson, in 1913. It was obviously, for Mr. Anderson, a sobering experience.

In his address, the president recalled the theme of his father's address 48 years ago. A quotation was singularly appropriate half a century later—" In common with many other industries the science of coal-mining is advancing, and the mining electrical engineer must extend his knowledge to cope with the conditions which are constantly arising."

Duties of Top Management

In the half century which had elapsed since the formation of AMEME, Mr. James Anderson said, machines had brought great benefits to mining—conversely they had brought dangers. They all had a duty to ensure that invention and machine were used in the right way, but the best machinery in the world and the most modern production methods would fail to gain their full results without the intelligent and willing co-operation of the men involved.

In the wider field of management in industry, he asserted that top management should be concerned with five main duties:—General leadership of the company, selection and appointment of staff, determination of the future course of the company, best use of capital, and external relations of the company.

Turning to industrial relations—" not a new phase in industrial life but as old as industry itself "—the president said that the difference between maximum production and something less could lie in the difference between an actively co-operative team and an uninformed and apathetic body of workers. " Under current global economic conditions and the gradual evolution of industrial life there can only be 'industry.' Subdivided it may be into the many executive, technical, production, and ancillary levels which we know today, but if it is to exist, produce, and prosper, it can only do so by maintaining an undivided front born of the realization that employer and employed are mutually dependent on each other," he said.

The first of the technical lectures was given by Mr. W. V. Sheppard, director-general of production and reconstruction, National Coal Board, and his subject was " Higher Productivity from the Better Use of Horsepower at the Coal Face." The maintenance of a rapidly growing quantity of mechanical and electrical equipment, much of it below ground, was a major factor in the drive for higher productivity and presented a problem that had steadily increased in complexity in recent years, he said.

The reward of substituting horsepower for muscle-power was greatly increased productivity per man, but, Mr. Sheppard warned, the penalty exacted by a breakdown might be the total loss of output until the fault was rectified by repair or replacement.

In the past there was a tendency to regard breakdowns as inevitable and equipment was commonly allowed to run until a breakdown occurred. With modern systems of mining that policy must be rejected by every one of their engineers, the speaker insisted. Emphasis must be on prevention rather than cure with equipment designed so as to be immune from breakdown under normal working conditions for a reasonably long period provided it was properly serviced.

Initiative, drive, and continued co-operation between the coal-mining industry and the manufacturers of mining machinery had now led to the development of equipment which enabled coal to be mined continuously at a high rate of productivity on one, two, or three shifts a day, Mr. Sheppard concluded. The complete utilization of this equipment was, however, dependent on the adoption of high standards of pratice covering concentration, organization, operation, design and construction for reliability, and maintenance. OMS normally stood for output per manshift—it could only come in full measure from Organization, Maintenance, and Supervision.

Taking up the same theme, Mr. J. N. L. Woodley, chief engineer, No. 2 Area, Durham Divisional Coal Board, in the final lecture of the convention, said that the next 10 years would see a technical revolution on the means of winning coal at those new and reconstructed mines from which 80 per cent. of coal output would flow. The revolution would be centred on the coal face and it was essential that mining electrical and mechanical engineers should focus more and more of their attention on this zone so that design might be channelled in the most practicable lines and so that prototypes should be operated and maintained to give the greatest chance of success.

Mr. Woodley went on to deal with the pattern of power and the problems it posed—high mobility required, the limited space available, and the exceptionally safe system required in arduous and peculiar operating conditions. He, too, underlined the dependence of modern coal-face operations on the reliable performance of the plant provided and the penalty of plant failure.

Ensuring freedom, even from short breakdowns in power-loading plant and that the proper amount of maintenance was carried out with a team of men

adequate in number and training available to carry it out, this country, he suggested, had fallen short of continental development. In Germany up to 11 per cent. of underground workers might be mechanics and electricians, while the corresponding proportion for the Netherlands State mines was 12.2 per cent. In this country it was 6.75 per cent.

Summing up, Mr. Woodley said that the challenge mining electrical and mechanical engineers faced today was to ensure that colliery engineering organizations were sound, making full and proper use of technical manpower and ensuring that a clear line of responsibility ran through all levels of control—organizations that formed the basis for laying down a maintenance and repair system devised to ensure safe working and providing satisfactory operation of machinery at a predicted and calculated minimum of cost. No part of this could produce the mining engineer with the face horsepower he needed without the machinery manufacturers, whose constant effort to provide more power plant of more compact construction had to be balanced against the need for reliable operation, for true interchangeability of spares, and for a reasonable standardization of components.

The 13th "W. M. Thornton Lecture"—"Generation and Bulk Transmission of Electricity by the Central Electricity Generating Board" was given by Mr. A. R. Cooper, member of the Central Electricity Generating Board responsible for operations and personnel.

At the annual banquet last Friday the toast of the Association was proposed by Mr. E. H. Browne, deputy chairman of the National Coal Board. Mr. Anderson replied. The guests were welcomed by the immediate past president, Mr. A. E. Crook.

No reference to the convention would be complete without mention of the "works visits"—again an outstandingly successful feature of the AMEME gathering. Hospitality was extended by Steel, Peech & Tozer, branch of the United Steel Companies, Limited, Rotherham; Ceag, Limited, makers of miners' electrical safety lamps, etc., of Barnsley, and Qualter, Hall & Company, Limited, mechanical and structural engineers, etc., also of Barnsley; the Bradford works of the English Electric Company, Limited; Hopkinsons, Limited, engineers, bronze, iron, and steel founders, of Huddersfield; British Jeffrey-Diamond, Limited, makers of mining machinery, crushers, air turbines, etc., of Wakefield; and Richard Sutcliffe, Limited, makers of mining machinery and mechanical handling equipment, of Horbury, near Wakefield.

Minister Urges Shipyards to End "Record of Strike"

INDUSTRIAL record of the shipbuilding industry was a tragic one of strife and bitterness, not only between managements and employees but between one group of workers and another, Mr. John Hare, Minister of Labour, said at a businessmen's luncheon at Newcastle-upon-Tyne, recently.

On average, the shipbuilding industry lost more in strikes in relation to the number of men employed than any other industry in the country. This made the survival of the industry more difficult.

Mr. Hare said he was sure those engaged in the industry did not want this state of affairs, and he hoped they would get together without delay, without trying to put the blame on one side or the other. He added that North-east coast shipyards had a better record of industrial relations than the shipbuilding industry as a whole.

Wages Compensation Plan by Steel Peech & Tozer

SPECIAL compensation scheme is announced by Steel, Peech & Tozer, branch of the United Steel Companies, Limited, for established employees who will have to take less highly paid jobs when the 21 open-hearth furnaces are replaced by six 110-ton electric furnaces over the next five years. The development, which will give the works the largest electric steelmaking plant in the world, capable of producing an annual ingot output of 1,350,000 tons of steel, compared with the present 1,000,000 ingot tons, will result in the reduction of the labour force by 1,000 men.

Some of these men will be retired, says the company, and some will be redundant, but it is hoped that redundancy will be confined to temporary employees. It is expected that employment will be found for established regular employees, but this will mean offering some of them jobs in departments other than the new melting shop.

In the main these jobs will be less highly paid than at present, and there will be some hundreds whose earnings will be reduced varying between £3 and £6 a week.

The company proposes to pay some compensation for loss of status and earnings, and "because of the very exceptional circumstances" will make ex-gratia payments, based on the actual average weekly loss, years of service, and age, up to a maximum payment of £300.

Mr. B. M. Swift Heads New AEI After-service Depot

TO co-ordinate after-sales service for all its products, the heavy plant division of Associated Electrical Industries, Limited, has established a service department, with headquarters in Rugby. The manager of this new department is Mr. B. M. Swift. Son of the late Mr. E. M. Swift, one of the pioneers of the British Thomson-Houston Company, Limited, now one of the AEI group, he joined BTH at Rugby in 1929 as an engineering apprentice and later went into the industrial sales department.

After the war Mr. Swift served for two years in the London district office before returning to Rugby to take charge of the service section of industrial sales department. Subsequently he was in charge of the company's hard metal sales (Ardoloy). Mr. Swift is a member of the Institution of Electrical Engineers and a member of the Association of Mining Electrical and Mechanical Engineers.

REDUNDANCY AT SOUTH DURHAM STEELWORKS

ABOUT 90 workers at the South Durham Steel & Iron Company, Limited, will be paid off at West Hartlepool next month, partly because of "tighter trading conditions." The melting shop at the company's North works is to be closed down from July 12. Another reason for the closure is the commissioning of a fourth 350-ton steel furnace at the new £53,000,000 South works.

The company also states that owing to reduced demand for plates and the changing pattern of orders, the slabbing mill at the South works is dropping two shifts per week.

Birthday Honours

MR. ROBENS A LIFE PEER

Knighthoods for Leading Industrialists

CHAIRMAN of the National Coal Board, Mr. Alfred Robens is made a life peer in the Birthday Honours List, which this year contains some 2,300 awards, including knighthoods for a number of prominent industrialists. Mr. Robens, former Labour MP for Blyth, took up his appointment as chairman-designate of the NCB on October 1, 1960, and succeeded Sir James Bowman, as chairman when Sir James's term of office expired on January 31 this year.

Among industrialists in this year's honours is Sir Ivan Stedeford, chairman and managing director of Tube Investments, Limited, and subsidiaries, since 1944, who is made a Knight Grand Cross of the Order of the British Empire.

SIR IVAN STEDEFORD

Sir Ivan, who was knighted in the 1954 Birthday Honours list, is 64. Educated at King Edward's School, Birmingham, he served an engineering apprenticeship with Vickers, Limited, and joined Tube Investments in 1928, being made a director in 1935 and managing director in 1939. A year ago he was appointed chairman of the advisory group on the British Transport Commission. He has been a member of various Government tribunals, including that which inquired into the workings of the BBC in 1949, and is a member of the Atomic Energy Authority.

Details of Awards

Details of some of the principal awards, with biographical notes on the recipients, are as follow:—

LIFE PEER
(Baron)

Mr. ALFRED ROBENS, chairman of the National Coal Board, who is 50, was educated at a council school and became an official of the Union of Distributive and Allied Workers in 1935. He was a Manchester City Councillor from 1942-45, MP for the Wansbeck Division of Northumberland, 1945-50, and MP for Blyth from 1950-60. He was Parliamentary Private Secretary to the Minister of Transport, 1945-47, Parliamentary Secretary to the Minister of Fuel and Power 1947-51, and Minister of Labour from April 1951 to the following October. He succeeded Sir James Bowman as NCB chairman in February.

BARONET

Sir JOHN MAXWELL ERSKINE, chairman of Fairfield Shipbuilding & Engineering Company, Limited, shipbuilders and engineers, of Glasgow, a director of Lithgows, Limited, and deputy chairman, North of Scotland Hydro-Electric Board, for public services in Scotland.

ORDER OF ST. MICHAEL AND ST. GEORGE
(Australia)

CMG

MR. G. C. L. CLARK, president of the Australian Institute of Mining and Metallurgy.

KNIGHTS BACHELOR

Mr. WILLIAM KENNETH GWYNNE ALLEN, chairman and joint managing director of W. H. Allen, Sons & Company, Limited, mechanical, electrical, and hydraulic engineers, of Bedford, and a director of Whessoe, Limited, capital plant manufacturers for the oil, atomic power, gas, and chemical industries.

Mr. JOHN FLEETWOOD BAKER, FRS, Professor of Mechanical Sciences and Head of the Department of Engineering, University of Cambridge. His many appointments include technical assistant to the Steel Structures Research Committee, 1931-36 and he holds many of the premier awards in mechanical and civil engineering. He was the designer of the Morrison indoor shelter and is a member of the council and the research board of the British Welding Research Association.

Mr. SYDNEY BARRATT, chairman of Albright & Wilson, Limited, industrial and research chemical manufacturers, of London, S.W.1, and a director of Joseph Lucas (Industries), Limited. He was made an honorary Fellow of the University College, London, last year.

Mr. ROBERT RUTHERFORD BLACKWOOD, general manager, Dunlop Rubber Company (Australia), Limited, for services to the University of Melbourne, State of Victoria.

Mr. ALLEN GEORGE CLARK, chairman and managing director of Plessey Company, Limited, radio, electronic and instrument manufacturers, of Ilford (Essex), and subsidiary companies including Amor Tool & Gauge Company, Limited, Machine Products, Limited, and others.

Mr. ALFRED GEORGE BEECH OWEN, chairman and joint managing director of Rubery Owen & Company, Limited, the structural and manufacturing engineering group, who is honoured for political and public services in Staffordshire, is chairman of Staffordshire County Council. Aged 53, he is noted for his activities in local political, social, and religious work. Educated at Cambridge University, he took over the Rubery Owen organization when he was 21, shortly after his father's

death, and since then the parent company has more than trebled in size and controls some 50 subsidiary companies.

ORDER OF THE BRITISH EMPIRE

(Civil Division)

GBE

SIR IVAN ARTHUR RICE STEDEFORD, chairman and managing director, Tube Investments, Limited, chairman, advisory group on the British Transport Commission; director, National Provincial Bank and Commonwealth Development Finance Company, Limited.

KBE

SIR LAWRENCE EDWARDS, chairman and managing director of Middle Docks Engineering Company, Limited, dry dock owners, shiprepairers, etc., of South Shields, and chairman, North East Coast Shiprepairers and South Shields Commercial Permanent Building Society.

CBE

MR. CHARLES FREDERICK BARNARD, executive vice-chairman of Mirrlees, Bickerton & Day, Limited, diesel engine manufacturers, of Stockport (Ches), executive vice-chairman of the National Gas & Oil Engine Company, Limited, a director of Hawker Siddeley Industries, Limited, and a member of the boards of other companies. MR. WILLIAM LINDSAY BURNS, chairman of Henry Balfour & Company, Limited, gas and chemical plant manufacturers, etc., of Leven (Fife).

MR. WILLIAM ALBERT FAIRHURST, senior partner, F. A. Macdonald & Partners, Limited, consulting engineers, of Glasgow. MR. WILLIAM LANCELOT FRANCES, director (grants and information), headquarters, Department of Scientific and Industrial Research.

MR. ARNOLD FRANK LAMPITT, managing director, Telephone Cables, Limited, Dagenham (Essex).

MR. ERNEST NORTON, research director, Yarrow & Company, Limited, shipbuilders, engineers and boilermakers, of Scotstoun, Glasgow.

MR. FREDERICK WILLIAM PAGE, director and chief executive, aircraft division, English Electric Aviation, Limited.

MRS. JOANNA MIRIAM SPENCER, assistant secretary, Ministry of Power.

MR. G. A. WHIPPLE, managing director of Hilger & Watts, Limited, scientific instrument manufacturers, of London, W.1.

OBE

MR. REGINALD HENRY BATES, president, British Cast Concrete Federation; PROF. ARTHUR BEACHAM, chairman, Mid-Wales Industrial Development Association.

PROF. DANIEL DOUGLAS ELEY, Professor of Physical Chemistry, University of Nottingham; MR. CLAUDE SCUDAMORE EMERY, lately sales director, Sir W. G. Armstrong Whitworth Aircraft, Limited.

MR. HENRY GARDNER, director of Glenfield & Kennedy (Holdings), Limited, holding company for Glenfield & Kennedy, Limited, valve manufacturers and hydraulic engineers, of Kilmarnock (Ayrshire), and other companies, and chairman of Kilmarnock and District Local Employment Committee.

MR. JOSEPH FREDERICK HIRST, senior principal scientific officer, Laboratory of the Government Chemist, DSIR.

MR. FRANCIS DOUGLAS LEY, chairman and managing director of Ley's Malleable Castings Company, Limited, Derby, chairman of Ley's Foundries & Engineering, Limited, and managing director of Ewart Chainbelt Company, Limited, for services to the Air Training Corps.

MR. DANIEL JOSEPH SKIDMORE, production director, Scottish Divisional Coal Board, for the past three years. After leaving Wath-on-Dearne Grammar School, Mr. Skidmore was articled to the managing director of the Dearne Valley Colliery Company, Limited, Little Houghton, near Barnsley.

MR. D. J. SKIDMORE

In 1939 he joined the labour and work study department of B.A. Collieries, Limited, Nottingham, and was appointed undermanager of its Gedling Colliery two years later. He became the company's planning engineer in 1945 and in July of that year was appointed HM Junior Inspector of Mines in the Yorkshire Division, first in the Doncaster District and later in Rotherham. On nationalization he was appointed planning engineer, No. 4 Area, East Midlands Divisional Coal Board, and was successively promoted mining development engineer, sub-Area manager, and (in 1952), Area production manager. He became Area general manager, No. 6 Area (Monmouthshire), South-Western Division, in 1954, and moved to Scotland in August, 1958.

MR. JAMES MELVILLE, technical manager, Vickers-Armstrongs (Shipbuilders), Limited, Barrow-in-Furness.

MR. FRANCIS ERNEST OSBORNE, engineering manager, Rolls-Royce, Limited (Lanarkshire).

MR. EDWARD WYNN PARRY, director and engineering manager, Cammell Laird & Company, Limited, shipbuilders and engineers, of Birkenhead.

MR. RICHARD JOHN RICHARDSON, technical director, Brown, Lenox & Company, Limited, engineers, steelfounders, and chain, cable, and anchor manufacturers, of Pontypridd (Glam), who has been associated with the company since 1922. He joined the company as manager of its new steelfoundry at the time when his father, Mr. J. B. Richardson, was managing director. He became a director in 1930.

MR. RICHARD THOMAS, retired colliery proprietor, of Swansea, for services to music and the arts; MR. WILLIAM HENRY TWELLS, principal, Ministry of Power.

MBE

MR. HAROLD FRANCIS BANKS, vice-principal and head of the Department of Mining, Doncaster Technical College, began as a teacher in mining at Heanor Technical College (Derbyshire), and then became head of the mining department of Chesterfield Technical College. Later he was at Cannock Technical College until moving to Doncaster in 1947; MR. WILLIAM CHARLES, formerly employed at Hafod Colliery, Wrexham, and a member of Wrexham Rural District Council; MR. WILLIAM ERNEST BELL, superintendent, applied electronics laboratory, Portsmouth, General Electric Company, Limited; MR. WILLIAM BRANSTON, assistant blast-furnace manager, Lysaght's Scunthorpe Works, branch of G.K.N. Steel Company, Limited, steel

manufacturers; MR. WILLIAM DOUGHTY BROWN, export manager, George Angus & Company, Limited, makers of oil seals, fire hose, belting, gears, etc., of Newcastle-upon-Tyne.

MR. GEORGE CLELAND, Sen., works manager, Heathfield & Cardowan Fireclay Company, Limited (Lanarkshire); MR. HERBERT FREDERICK COLLARD, chief draughtsman, E. N. Bray, Limited, Waltham Cross (Herts); MR. WILLIAM RAMSDALE COLLIER, chief engineer of the naval section, Rose Bros. (Gainsborough), Limited; MR. MARTIN CULLEN, fitting shop superintendent, James Howden & Company, Limited, Glasgow; MR. ARTHUR CUNLIFFE, rescue station superintendent, Boothstown, North-Western Divisional Coal Board.

MR. EDWARD HARRISON, commercial manager, Platt Bros. (Sales), Limited; MR. THOMAS GORDON CAMPBELL HARROP, electrical manager, J. I. Thornycroft & Company, Limited, Southampton; MR. JAMES FREDERICK HAYES, civil defence officer, West Midlands Divisional Coal Board.

MR. JOHN KAISER, manager, outside power plant erection department, Richardsons Westgarth (Hartlepools), Limited, a subsidiary of Richardsons, Westgarth & Company, Limited, marine, turbine, electrical and general engineers, Wallsend-on-Tyne; MR. DONALD KITCHER, research and testing manager, Santon, Limited, switchgear and water-heater manufacturers, of Newport (Mon); MR. JOSEPH LYON, chief metallurgist, Barrow Steel Works, Limited, Barrow-in-Furness (Lancs); MR. JOHN STEWART MCCUTCHEON, cashier at the Victoria Iron Works, Coatbridge, of Bairds & Scottish Steel, Limited, for services to St. Andrew's Ambulance Association; MR. ROBERT MCKENNA, senior executive officer, Ministry of Power; MR. JOHN DILLWYN MATTHEWS, senior executive officer, Ministry of Power, Cardiff; MR. ERNEST CHARLES WILLIAM MAYCOCK, senior experimental officer, Laboratory of the Government Chemist, DSIR.

MR. THOMAS PARKER, lately assistant general manager, No. 4 (Aberdare) Area, South-Western Divisional Coal Board, retiring last year after 44 years in the mining industry; MR. JOHN JOEL ROWLAND, head of the marine department, the Electrical Apparatus Company, Limited, St. Albans (Herts); MR. DAVID JOHN THOMAS, lately a member of the National Executive Council of the Iron and Steel Trades Confederation, Port Talbot, president of the British Iron and Steel Trades Confederation in 1943 and holder of the TUC gold medal for outstanding trade union work; MR. WILLIAM HENRY YOUNG, Glynneath, until his retirement a year ago a National Coal Board accountant.

BRITISH EMPIRE MEDAL

MR. J. W. BREEN, foreman, Joseph Steel & Sons, Limited, Bingley (Yorks); MR. DAVID JAMES BROWN, head lampman, Groesfaen Colliery, South-Western Divisional Coal Board; MR. JOHN CLARK BUTTON, head foreman engineer, Tyne Dock Engineering Company, Limited, South Shields; MR. ALFRED CARTER, electrician wireman, J. I. Thornycroft & Company, Limited, Southampton; MR. ERNEST MARTIN COPE, dust and ventilation sampler, Mansfield Colliery, East Midlands Divisional Coal Board; MR. WILLIAM PETER DONOVAN, foreman, Stern & Bell, Limited, Birmingham; MR. GEORGE EDWARD GAIT, foreman, Kelvin & Hughes, Limited, Glasgow; MR. GEORGE MORRISON HANSON, salvage and general worker, Denaby Main Colliery, North-Eastern Divisional Coal Board; MR. HENRY ALBERT HARE, foreman of despatch department, Reldam Asbestos Company, Limited, Hounslow; MR. CYRIL HARRIS, overman (special duties), Donisthorpe Colliery, East Midlands Divisional Coal Board; MR. JOHN HENDERSON, overman, Cardowan Colliery, Scottish Divisional Coal Board.

MR. BENJAMIN W. HIGHLEY, wire drawer, Bruntons (Musselburgh), Limited; MR. WILLIAM HOLMES, deputy, Arley Colliery, West Midlands Divisional Coal Board.

MR. LAWRENCE LAVELLE, composite worker, Ashington Colliery, Northern (N&C) Divisional Coal Board; MR. NEVILLE PAGE LEAR, head foreman, Cammell Laird & Company, Limited, Birkenhead; MR. BRIAN LINSLEY, marker out, Ambrose Shardlow & Company, Limited, Sheffield; MR. JAMES MCKIM, foreman, G. & J. Weir, Limited, Glasgow; MR. WILLIAM GEORGE MASON, head foreman welder, Vickers-Armstrongs (Engineers), Limited, Barrow-in-Furness; MR. SYDNEY GRENVILLE MILLBOURNE, chargehand, Associated British Combustion, Limited, Southampton; MR. FRANK PHILLIPS, ripper and contract worker, Bickershaw Colliery, North-Western Divisional Coal Board; MR. STANLEY RAMSEY, chief steward, tanker Methane Pioneer, general service, Stephenson Clarke, Limited, South Shields; MR. WILLIAM ROBERT REED, foreman of navvies, Guest Keen Iron & Steel Company, Limited, Cardiff.

MR. STANLEY SCOTT, foreman millwright, South Durham Steel & Iron Company, Limited; MR. GEORGE SMITH, safety engineer, Buxton Lime Works, Imperial Chemical Industries, Limited; MR. STEWART MCDOUGAL WATSON, extrusion toolroom turner, Alcan Industries, Limited, Newport (Mon).

IMPERIAL SERVICE ORDER

MR. GWILYM JENKINS, HM Senior District Inspector of Mines and Quarries, East Midlands Division, and formerly HM Senior Inspector in charge of the North Staffordshire Area. He was formerly manager of Tylorstown and Ferndale Collieries in the Rhondda and joined the inspectorate in 1936.

Cranemakers Welcome Oversea Delegates

WELCOMING delegates at the opening of a three-day export sales conference at the factory of Thomas Smith & Sons (Rodley), Limited, on Monday, the chairman, Mr. Arnold Carr, quoting the slogan coined by the Prime Minister—"It's fun to export"—wondered if Mr. Macmillan quite realized that it also meant a tremendous amount of hard work not only here in Britain but on the part of all the agents in the various oversea countries.

MR. ARNOLD CARR

Delegates from no fewer than 18 countries attended the conference and the company is now fully represented in more than 60 countries. Thomas Smith & Sons, which manufactures cranes and excavators, has, during the post-war years concentrated on the building up of a large export business and Mr. W. H. Sharp (managing director) told delegates that the company regularly exported between 40 and 50 per cent. of its total production.

Lord Baillieu at Institution of Mining and Metallurgy

SPEAKING at the annual meeting of the Institution of Mining and Metallurgy yesterday (Thursday), Lord Baillieu, president of the Dunlop Rubber Company, Limited, referred to recent events in South Africa. He suggested that they remember the intimate ties which, down the years, had bound South Africa and its mining industry to this country and that nothing was done to embarrass the working of current relations nor the restoration in the years ahead of those wider relationships which, until this year, were part of the warp and woof of the mining industry of the Commonwealth.

Lord Baillieu was presented with the institution's Gold Medal for services to the industry.

Orders Placed

Steel Plate Levelling Line for Colvilles

STEEL plate levelling line is to be supplied by the Head Wrightson Machine Company, Limited, a subsidiary of Head Wrightson & Company, Limited, for installation at the Ravenscraig works, Motherwell, of Colvilles, Limited. The line is designed to handle hot rolled plate up to a maximum thickness of $\frac{3}{16}$ in., 5 ft. 3 in. wide, and 30 ft. long.

A further contract has been placed for two levelling and oiling lines for the Gartcosh, Glasgow, works of Smith & Maclean, Limited, a subsidiary of Colvilles. Handling sheets cut from cold rolled strip in gauges from 0.011 in. to 0.111 in., these lines will be used on special orders for precision flattened and oiled sheets. The total value of the orders is over £100,000.

AS A RESULT of the British Trade Fair in Moscow, Scottish Machine Tool Corporation, Limited, has received orders from Russia worth £37,500.

ORDER WORTH about £75,000 has been received by the traction department of Rolls-Royce, Limited, from the New South Wales Government Railways, for 13 horizontal diesel engines, torque convertors, reversers, flexible cardan shafts and controls.

ELECTRONIC EQUIPMENT valued at £200,000 has been ordered by Russia from the Solartron Electronic Group, Limited, Thames Ditton (Surrey), and Farnborough (Hants), following the British Trade Fair in Moscow.

ORDERS FOR THE supply of nearly 800 tons of high tensile steel castellated bridge beams, valued at nearly £54,000, have been received by William Bain & Company, Limited, Coatbridge (Lanarkshire), for the bridge steelwork in contracts Nos. 3 and 5 of the Forth Road Bridge

CONTRACT FOR building new offices at Spennymoor (Co. Durham) to house the whole of its No. 4 Area headquarters staff, has been given by Durham Divisional Coal Board to Holland & Hannen & Cubitts (Scotland), Limited. The offices are scheduled for completion in April next year.

AN ORDER for a bell-type furnace installation for the bright annealing of copper under vacuum conditions has been placed with the General Electric Company, Limited, by Pirelli-General, Limited. The installation will comprise four identical bell-type furnaces designed for a maximum temperature of 500 deg. C. and its rated output will be over 250 tons per week.

FOR INSTALLATION at Blyth "B" Power station, Northumberland, the Central Electricity Generating Board, through the Northern Project Group, has ordered two transformers, worth about £400,000, from Ferranti, Limited. Of the highest rating yet ordered by the board, the transformers are to step up the generator voltage to 300 kV. and to provide a direct connection to the super grid.

THE Stanton Ironworks Company, Limited, near Nottingham, has secured a contract for the supply of 300 mm. to 650 mm. spun iron pipes, valued at approximately £200,000 to be used for extensions to the Alexandria sewage system. The order was obtained in the face of very keen international competition and is the first major contract for this material to be negotiated with Egypt since the Suez crisis.

REPEAT ORDER worth nearly £100,000 for six dual fuel engines has been received by the National Gas & Oil Engine Company, Limited, Ashton-under-Lyne (Lancs), a subsidiary of Hawker Siddeley Industries, Limited, from Orenda Industrial, Toronto, Canada. The engines are National FSCP seven-cylinder, HSBT pressure-charged, intercooled units, rated at 1,200 BHP at 600 r.p.m., 35 of which have already been specified in previous orders from Canada.

MEMBER OF THE Davy-Ashmore, Limited, group, the Power-Gas Corporation, Limited, Stockton-on-Tees, has been awarded a contract, worth about £1,500,000, for process plant for Poland. The order covers the supply of a urea plant capable of an output of 500 tons per day of specialized product for fertilizer use. The plant will employ the Toyo Koatsu process, which has been licensed to the Power-Gas Corporation from Toyo Koatsu, of Japan. This will be its first application in Europe.

ONE OF THE Simon Engineering, Limited, group of companies, Lodge-Cottrell, Limited, Birmingham, has been instructed by International Combustion, Limited, on behalf of the Central Electricity Generating Board, to supply precipitators for the new 2,000 mW West Burton power station, near Nottingham. Valued at £1,500,000, the contract represents the largest single order for boiler flue dust precipitators ever received by the company. Flue dust produced by the 500 mW pulverized fuel fired boiler units will be partially removed by mechanical collectors and final gas cleaning will be carried out by 16 electro-precipitators, four to each boiler unit.

AN ORDER from West Germany for a Metroflux type "T" universal magnetic crack detector has been received by Associated Electrical Industries, Limited. The unit, which is to be supplied to Klackner Humboldt Deutz, of Cologne, is designed to detect surface cracks and flaws in magnetic materials. The company is also to supply the 220 kV switchgear for the Hazelwood power station of the State Electricity Commission, Victoria, Australia. All the structures, isolators, overhead connections, and panels will be manufactured in Australia by AEI, but the circuit breakers themselves will be manufactured in the factories of the AEI switchgear division in this country.

NON-FERROUS METAL manufacturers of Birmingham, Charles Clifford, Limited, is to supply about 450 tons of zinc wire for metal spraying the steelwork to be used in the Forth road bridge now being built. Automatic spray equipment is being provided by Metallisation, Limited, Dudley (Worcs), an associate company of Charles Clifford. Spraying will be done at the Drem, East Lothian, depot of A.C.D. Bridge, Limited, and at the Darlington works of Cleveland Bridge & Engineering Company, Limited. A.C.D. Bridge, which has the contract for the superstructure of the bridge, is a consortium formed by Sir William Arrol & Company, Limited, Cleveland Bridge & Engineering, and Dorman Long (Bridge & Engineering), Limited.

BLAST-FURNACE CONTROLS FOR SPENCER STEELWORKS

TWO sets of blast furnace controls for the new Spencer Works of Richard Thomas & Baldwins, Limited, at Llanwern, near Newport (Mon), are being manufactured at the Bedford works of Brookhirst Igranic, Limited, a company in the Metal Industries, Limited, Group. The order was placed by Ashmore, Benson Pease, Limited, the blast furnace specialists, of Stockton-on-Tees.

Each set of controls consists of five open type switchboards. In addition a clay gun cubicle is being supplied for each furnace and a common stove ventilation panel to serve both sets as well as the necessary brakes, limit switches, and pushbuttons.

"Progress—with Safety" was the theme of the three-day annual conference of the National Association of Colliery Managers, held in Edinburgh last week under the presidency of Mr. H. H. Wilson. The conference was devoted to an examination of the implications of modern trends in mining practice in relation to safety, and to add point to the deliberations an exhibition of safety appliances was open in the conference building throughout the week.

IF the coal-mining industry is to compete successfully with alternative fuels the drive for greater efficiency must continue. This will involve, *inter alia*, progressive increases in the tonnage of power-loaded coal, faster face advances, and greater concentrations.

These developments pose new problems, but there is no reason why higher rates of production should be accompanied by a reduced margin of safety. On the contrary, new techniques bring with them the prospect of fewer accidents.

Record Attendance

That, in brief, is the message the 1961 conference of the NACM was intended to convey, and the safety exhibition held in conjunction with the conference hammered the message home to the record number of mining engineers who attended the meetings and joined in the discussions of the papers presented.

The three-day conference was held in the spacious rooms which together comprise Edinburgh's Assembly Rooms and Music Hall, but roomy as it is, the building could not accommodate everybody who wanted to be present at the various events. Tickets for some of the functions had to be refused when the lists were full, and for the president's reception on the final evening there was an inevitable overflow into the exhibition halls. An average of 450 attended the annual meeting and the six technical sessions, and members with their ladies and other guests made up a total of 840 for the annual banquet, which was perforce held in two rooms.

Minister at Safety Exhibition

The safety exhibition (see IRON AND COAL, June 2, 1961, p. 1171) was organized by the Safety in Mines Research Establishment of the Ministry of Power and the National Coal Board. Thursday afternoon was devoted to an official conference visit to the exhibition, but delegates were to be found examining and inquiring about the exhibits at all times throughout the conference period.

Mr. Richard Wood, Minister of Power, who was a guest of the association at the annual banquet on Thursday evening, made an official inspection of the exhibition on Friday. Special coalfield visits to the exhibition were held during the week.

The formal business of the conference began in the Assembly Rooms on Tuesday morning, when the Rt. Hon. John Greig Dunbar, Lord Provost of the City of Edinburgh, accorded the delegates a civic welcome.

Mr. H. H. Wilson, president of the association for 1960-61, voiced his pleasure that circumstances had enabled him to bring the annual conference to Edinburgh. To Scots, Edinburgh was still their capital city, symbolizing the whole history of the

CONFERENCE PAPERS

PAPERS presented at the 1961 annual conference of the National Association of Colliery Managers in Edinburgh will be printed in full, together with the discussions which followed, in subsequent issues of "Iron and Coal."

Scottish people. Since it was first decided that the conference would be held there, every encouragement—and a great deal of guidance and assistance—had been given by the civic administration, and it was most pleasing that the Lord Provost should see fit to be present that morning to open the proceedings.

The Lord Provost was glad to have the opportunity to be associated with the annual conference of the NACM. It was with particular pleasure that he welcomed all who were attending, especially in view of the long association of Edinburgh with the coal-mining industry. He was told that coal was being worked in the neighbourhood as long ago as 1210. The development of coal production still continued, but it was only in recent years that the city had assumed importance as a centre for mining discussions. He wished the conference every success.

The annual general meeting of the association followed.

Annual Meeting

Presenting the statement of accounts for the year ended December 31, 1960, and the balance-sheet as at that date, Mr. J. Whyld (hon. treasurer) said that they disclosed a deficiency of £632 for the year, the income being £6,215 and the expenditure £6,847. Arrears of subscriptions amounted to £368. He was not concerned at the position, and he saw no reason for increasing subscriptions. At the same time, he hoped the members would appreciate that for £2 12s. 6d. per annum they were getting real value for their money.

Halberdiers and City Officers in attendance, NACM president H. H. Wilson and Mrs. Wilson are received in traditional ceremony by Edinburgh's Lord Provost.

In the past year the association had spent nearly twice as much on the defence of members as in the previous year. The council was of the opinion that this money was well and wisely spent, and he believed all members would agree. They always hoped it would not be necessary to spend money in that direction; but the General Council would never shirk its responsibility in supporting a genuine case.

While appreciating that at the annual meeting he was speaking to the converted, Mr. Whyld appealed that the message be spread among the members in the branches that subscriptions were due on January 1 each year, that so long as a member's subscription was not paid he was an added liability, for time and money were spent on sending reminders; respectfully he suggested the use of a banker's order. He also drew attention to the Prizes Fund and reinforced the paragraph in the annual report relating to the existence of the Benevolent Fund and the help it could give.

The accounts were approved and the balance-sheet adopted.

The hon. secretary (Mr. F. H. Harley) presented the annual report of the council for the year 1960-61 (see last week's IRON AND COAL, p. 1219).

The hon. secretary reported that the total membership of the association to date was 3,032.

The president said the membership figures were very gratifying; and on behalf of the council and of the association's members throughout the country he expressed indebtedness to Mr. Harley for the hard work he had put in as hon. secretary.

Mr. Wilson then delivered his presidential address (IRON AND COAL, June 9, 1961, p. 1221).

Mr. H. E. Tyson, moving a vote of thanks to the president, said that Mr. Wilson had delivered the sort of address the members had expected of him, sincere in everything he had said. Mr. Tyson commended the address to all who had the power and authority to implement its advice. Mr. W. Sharpe seconded the proposal, and on behalf of all members congratulated the president on a most successful year of office. The vote of thanks was accorded with acclamation, and the president briefly expressed his appreciation.

The president, before calling for the report of the Prizes Committee, said he wished to place on record the council's appreciation and the thanks of the association as a whole to the committee for its services. The assessment of papers for the award of prizes, he said, was not an easy task. He asked Prof. Hibberd, chairman of the committee, to accept that expression of thanks and to convey it to any members of his committee who were unable to be present at the annual meeting.

Mr. A. E. Hiscox, newly elected president of the NACM, photographed with his vice-presidents after the first meeting of the new General Council at Edinburgh last week. Left to right: Mr. S. A. McKee, Mr. S. W. Potts, Mr. Hiscox, Mr. G. Inverarity, Mr. C. F. Palmer.

The hon. secretary, announcing the Prize Committee's awards for 1960, said that the Futers Gold Medal had been won by Mr. J. Sheldon, of the Midland Branch, for his paper on "Power Loading in the East Midlands." Silver medals were won by Mr. J. Hislop (Scottish Branch) for his paper on "Mechanization at Whitehill Colliery," and Mr. C. Round (Midland) for his paper on "Support of Coal Faces in the East Midlands."

Bronze medals had been awarded as follows:—Mr. P. I. Allsop (Midland Branch) for his paper on the "Reorganization of Langwith Colliery"; Mr. K. Kay (North of England), "Hydraulics in Mining"; Mr. S. A. McKee (South Midland), "Monorail Haulage Systems in Mines"; and Mr. H. Wright (Midland), "Vermiculite in Coal Mines."

The Muschamp Prize of £25 was won by Mr. E. E. Crankshaw, of the Yorkshire Branch, for his paper on "Solid Stowing on a Mechanized Face at Wharncliffe Silkstone."

An IRON AND COAL Prize of £10 was won jointly by Mr. G. F. Mee and Mr. F. W. Smith, of the Midland Branch, for their paper on the "Development of the Lump Shearer." IRON AND COAL prizes of £5 each went to Mr. A. D. McLuckie, of the Midland Branch, for his paper on "Roadway Support in Mines"; and to Mr. D. Smith (South Midland) for his paper on "Material Control and Salvage in Mines."

Mr. E. H. Browne (deputy chairman, National Coal Board), at the request of the president, presented the silver and bronze medals and prizes to those recipients able to attend the meeting.

As the result of the ballot of members it was announced that Mr. A. E. Hiscox was elected president for the ensuing year, and Mr. J. Whyld was re-elected hon. treasurer.

Mr. Hiscox expressed his thanks to the members for having elected him national president and said he would endeavour, with the aid of the council, to serve the association as well as it had been served for so many years past.

Mr. Whyld also thanked the members for the compliment of electing him again as hon. treasurer.

The annual general meeting over, the members heard an address by Mr. E. H. Browne, deputy chairman of the National Coal Board, who, as a background to the conference, examined the broad position of the coal industry at the present time. The demand for energy in one form or another would go on rising, he said. They could hold the share in this for coal. The coal industry had to hold its markets, and it had to pay its way. For management the test, and the means to do those things, lay in efficiency, reflected in costs. Mr. Browne laid down five essentials to achieve the double objective.

Five Essentials

With the techniques established in the last decade, aided by new improvements, they must raise face productivity beyond the levels assumed before those techniques were available, choosing the most favourable methods in terms of overall cost—and profit, he said. They must hold down labour costs elsewhere underground and on the surface. They must make maximum use of profitable capacity, especially that of reconstructed pits, and carry on with the careful evolution of plans to cut out uneconomic capacity. They must hold markets by holding prices at levels competitive with oil and by giving the customer the fuel which he wanted, which was what it purported to be, and which was consistent in quality with specification. They must mobilize all the latent capacity of human beings in the industry to spur themselves to keep pace with the conditions of the day.

After the morning session, the members were the guests at luncheon of Imperial Chemical Industries, Limited. Dr. J. M. Holm, chairman of the Nobel Division, Glasgow, of ICI, who presided, commended the theme adopted for the conference. In his division of ICI safety was a prime consideration. By setting high manufacturing standards, by training, and by constant propaganda, his company had tried to induce a feeling of collective responsibility for safety in its staff and workers, and records over the years showed that some measure of success had been achieved. He was

Contributors of Papers at the NACM Conference

Mr. E. H. Browne

Dr. William Reid

Sir Andrew Bryan

convinced that an essential to that success was that top management should take a genuine and active interest in safety and constantly make its conviction known, through line management, to all personnel.

In the Nobel Division they felt a special responsibility to the colliery managers as representatives of the coal-mining industry for the quality and reliability of the explosives they made and they devoted very much thought and effort to ensuring that they could be used with safety and with maximum efficiency in the mines. Although—to his company's regret—the mining industry was now using less explosive than formerly, it still used a great deal each year, and the company's research department was continually striving to develop new explosives and accessories which would be still safer in use. While records showed that they had had considerable success in reducing the ignition hazards with explosives, they would still persevere with their developments and would not be content until the hazard had been removed altogether. In introducing these new developments he felt sure they could rely on the co-operation of the NACM.

Industry's Safety Record

"Campaigning for Greater Safety" was the title of the opening paper of the afternoon technical sessions. Dr. William Reid, chairman of the Durham Divisional Coal Board, said that management in its routine daily work had reduced accident injury frequency and severity very considerably, but the current annual record of the industry gave the mining engineer no joy in reading it. Progress was too slow, and it could only be accelerated by extraordinary means. The success achieved in America by the Union Pacific Coal Company and in Scotland by the Fife Coal Company, Limited, in earlier years had proved conclusively that where extraordinary means had been accepted and used, extraordinary progress had been made. What was mainly required was strength of leadership from the top, a staff of safety engineers and officers inspired and devoted to the task, and a general acceptance by colliery managers that greater safety could be achieved. The problems of hard physical conditions underground, and perhaps of numbers of unbelieving and unresponding officials and workmen, could be overcome in time. There was no short-term answer.

The development and proving of appliances at the NCB's Central Engineering Establishment were described by Dr. P. G. Taigel, the establishment's chief proving engineer, in the second paper on Tuesday afternoon. Some notable contributions to safety were listed. Having outlined the objectives and organization of the CEE, Dr. Taigel discussed the work of the development branches. Operations cover activities in the stable hole, at the face, at the roadhead and the ripping lip, and in road support. The proving branch of CEE is concerned with approval schemes for roof supports and conveyor belting, with non-destructive testing, and general defect investigation.

Annual meeting and two technical sessions concluded, members relaxed in the evening at a civic reception given by the Lord Provost and magistrates of Edinburgh. A total company of nearly 750 members, wives, and guests were able to take part in this most enjoyable function.

The principles of accident prevention were discussed by Sir Andrew Bryan in a paper presented at Wednesday morning's technical session. Positive and dynamic action was the key, he said. "The ability and the facilities to prevent accidents lie to our hands. What is required from each one of us is a conscientious effort, based upon a thorough understanding of the principles. In this matter we must accept our moral obligations and our legal responsibilities."

Following the meeting on Wednesday morning, there was an early lunch, at the invitation of Anderson, Boves & Company, Limited, for the members and male guests had to join their ladies and entrain for Gourock early in the afternoon, to embark on the Duchess of Montrose for a cruise down

the Firth of Clyde. The ladies meantime were lunching at the invitation of Becorit (G.B.), Limited.

Chairman at the men's luncheon was Mr. Forrest Anderson, who expressed appreciation of the good relationships that had always existed between the mining machinery manufacturers and colliery management. It was a particular pleasure for him to preside in the presidential year of Mr. Harry Wilson, for many long years since they had sat together in the mining classes in Glasgow, and throughout the intervening years he had enjoyed Mr. Wilson's friendship.

Safety in relation to modern forms of support was examined by Mr. W. J. Adcock and Mr. H. Cunliffe in the last of the technical papers presented to a full and interested gathering on Thursday morning. Mr. Adcock is head of the Strata Control Branch of the NCB, and his co-author is strata control engineer in the Scottish Division. Despite increasing expenditure on supports, accidents from falls of ground still accounted for the majority of fatal and reportable accidents, the authors pointed out, and it followed that every effort must be made to obtain the safety dividends which could accrue from the use of the new supports now available. In assessing their value as a safety factor as opposed to an aid to production it must be remembered that without the yielding prop and link bar the application of the prop-free front would have been impossible. That system of support had in turn led to an increase in the application of caving as a means of waste support. It was possible that the accident risk over the past decade would have been greater had not those supports been introduced.

What lessons could be learned from the accident statistics? They had seen that when the most modern support technique, in the form of power-operated supports, was applied to the face accidents occurring from falls of ground were virtually eliminated, but that another type of accident immediately took its place. It was suggested that one of the major factors to be considered in that connection was education. Management at all levels must ensure that every under-official and man using modern supports and support systems fully understood them, and that a support system once it had been agreed was rigidly applied at all times.

The closing address to the conference was given by Mr. Alfred Robens, the chairman of the National Coal Board, soon, although his hearers were quite unaware of it, to be elevated to the peerage.

Mr. H. H. Wilson, in opening this final session, said it had now become customary for the board's chairman to address the annual conference at the conclusion of the technical sessions. That practice was started by Sir James Bowman, and the association was glad that the new national chairman, Mr. Robens, had seen fit to "carry on." "We welcome you, sir," said the president, "and

NACM VICE-PRESIDENTS

VICE-PRESIDENTS of the National Association of Colliery Managers for 1961-62 are Mr. G. Inverarity (Midland Branch), Mr. C. F. Palmer (Yorkshire), Mr. S. W. Potts (North of England), and Mr. S. A. McKee (South Midland). Mr. Potts and Mr. McKee fill vacancies created by the elevation of Mr. A. E. Hiscox to the presidency and the resignation of Mr. L. A. Atkinson on his retirement. Mr. Inverarity and Mr. Palmer were re-elected.

Left: The Lord Provost of Edinburgh listens while Mr. H. H. Wilson speaks at the NACM dinner. Right: Top table guests look on with interest as Mrs. Wilson presents the Futers Gold Medal to Mr. J. Sheldon.

Contributors of Papers at the NACM Conference

Dr. P. G. Taigel

Mr. W. J. Adcock

Mr. H. Cunliffe

I personally am deeply appreciative of your presence."

It might not be without significance, he continued, that the last time Mr. Robens had spoken at a national conference was when it was last held in Edinburgh. He was at that time Parliamentary Secretary to the Ministry of Fuel and Power and had given the toast of the association at the annual dinner. As might be expected from a Minister, he had spoken at length on accidents, referring particularly to the grave personal responsibility of managers; but he had also spoken of the position of the industry. The president quoted his words on that occasion:

"The nation was in need of coal—it wanted coal of good quality and it wanted it at a reasonable price. There was no body of people who had a more difficult task in industry when they tied up those three things—production, quality, and cost."

That he should now return to a conference whose main theme had been "safety," and at a time when the three aspects he had referred to more than 10 years ago had become so vital, was particularly apt, the president said.

An account of Mr. Robens's address appears on page 1283.

Annual Dinner

The final function of the conference was the annual dinner and dance of the association, on Thursday evening. The members and their ladies and the many guests of the association filled to capacity the large Assembly Room and the Music Hall, and some were seated at tables on the stage. Mr. H. H. Wilson presided.

Mr. Richard Wood, MP, Minister of Power, proposed the toast of "The Industry and the National Association of Colliery Managers." Colliery managers, he said, had to be almost archangels. They required to have technical skill, they had to keep abreast of mining developments, and they were responsible also for the provision of safety measures at their pits. He was delighted to hear about the reference made by Mr. Robens that morning to a national safety campaign, for no subject was of greater importance. Another great responsibility which the members of the association had was the management of large units of production. It seemed to him that, with all those responsibilities and the necessity to give a great deal of thought to their day-to-day problems, they could hardly have sufficient time to think about the problems of tomorow and of how to avoid them. He hoped the association would give to the problems of today the amount of attention they should have, while still having freedom to think about the problems of tomorrow and how to avoid them.

Mr. H. H. Wilson, responding to the toast, said he was naturally very proud of the overwhelming response to this year's conference; and as president of the association he welcomed all who were present at that record gathering. He felt that he must apologise for the need to have part of the gathering dining in the Music Hall and an overflow in the adjacent Assembly Room, and he hoped those who were necessarily placed in the Assembly Room would be tolerant, bearing in mind the great cause on which the theme of the conference had been based—co-operation for safety.

He had now almost completed his year of office as president and would shortly be installing his successor. Though his presidential duties had entailed a considerable amount of travelling and hard work, he had enjoyed it, and was glad that it had provided him with the opportunity of having this final essay on a subject very dear to his heart. That being his last opportunity to do so, he wanted to thank everyone who had assisted in any way in organizing the conference. His thanks were given not only to his immediate colleagues in the Scottish Division, who had worked so hard to make the conference a success, but also to the members of his divisional board for their great tolerance and help during his year of office.

In addition there was the very great service rendered by the hon. secretary, Mr. F. H. Harley,

and his staff in London. The officers and members of the association were very upset by the untimely death of Mr. Barrington Hooper, who was such an expert and indeed a tower of strength on such occasions. His mantle had fallen on the shoulders of his son, Mr. Frank Barrington Hooper, who, it would be agreed, had not let his illustrious father down. The president also expressed his sincere thanks to Miss G. M. Bott, Miss B. Crockford, and Mr. H. Cooper, who had laboured so hard behind the scenes. He was also indebted to the many friends who had come forward so willingly and had volunteered to help in a material sense, which had meant so much in making the occasion so enjoyable.

An innovation this year had been the Safety Exhibition. He was sure all would agree that it had been an outstanding success, and could do nothing but good in furthering the cause of safety. He acknowledged the great help given by the SMRE, the Central Engineering Establishment of the NCB, and the safety engineers of the Durham and Scottish divisions. He was very grateful for the organization work done locally by Mr. T. Samson and Mr. F. Baker, which would otherwise have fallen on his shoulders.

It was fitting that, with such a theme for the conference, the association should be honoured by the presence of the Minister of Power. Mr. Wood had come to Edinburgh at great inconvenience, which one was sure was the correct measure of his personal interest in the deliberations. He thanked the Minister on behalf of the association.

Mr. A. E. Hiscox proposed the health of the guests and coupled with the toast the name of Mr. Alfred Robens, whose address to the conference that morning, he said, had inspired all who had heard it. That evening's gathering was the biggest yet for the association's annual conference. No president could have wished for greater hospitality from the city in which his conference was held or for a more distinguished body of guests than were present that evening. The conference had received hospitality in full measure from the people of Edinburgh; he expressed the thanks of all present to the Lord Provost for having received them so graciously on the Tuesday evening, and asked him to accept thanks also to the citizens of Edinburgh as a whole.

All were grateful also to Mr. Wood, the Minister of Power, for his presence and for the interest which he and his Ministry, headed by Sir Dennis Proctor, had shown in the association. They greeted also Mr. A. M. Rake, from the Ministry, and Mr. T. A. Rogers, HM Chief Inspector of Mines.

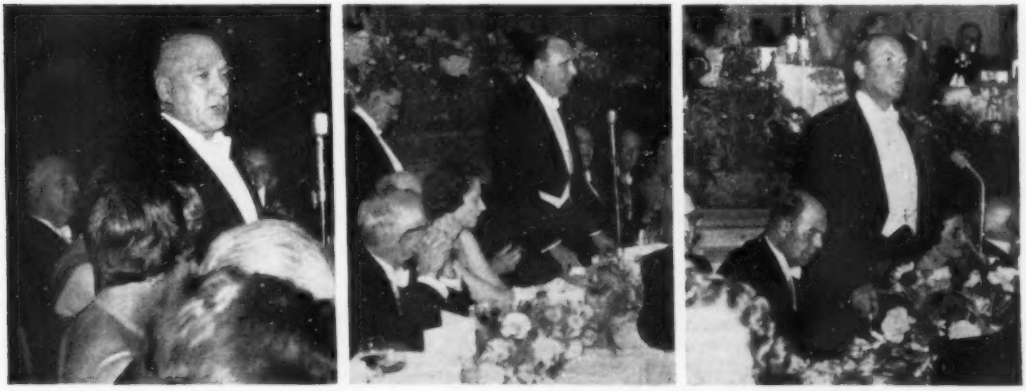
It was a great pleasure to have the presence of Mr. Robens and of three other members of the NCB, and he was glad to claim two of them as members of the association. Also, the association was grateful to the divisional chairmen who had kindly graced the gathering, to the representatives of kindred societies, and to the many companies which had so kindly extended hospitality to the members and their ladies.

There were present, in addition to Mr. R. W. Parker, most of the members of the Scottish Divisional Coal Board, Mr. Hiscox said he would be lacking in his duty if he did not express to them the very sincere thanks of the association for the support they had given to this particular conference. Without that help it could not have been the huge success which he believed everybody would concede it was.

In a tribute to Sir Andrew and Lady Bryan, he said Sir Andrew was a friend to every colliery manager in the country, and they hoped he would remain with them for a very long time to come.

Mr. Alfred Robens, responding, said it afforded him very great pleasure to say "Thank you" to the association and to Mr. Hiscox for the very kindly hospitality extended to the guests.

In saying a special "Thank you" on behalf of the Ministry he felt he could do so more easily than most, because for four years he had had a



Pictured at the NACM annual dinner. Left, Mr. A. E. Hiscox proposes a toast to the guests, to which Mr. Alfred Robens (soon to be raised to the peerage) responds. Right, Mr. Richard Wood, Minister of Power, addresses the members and their guests.

wonderful opportunity to serve there in a junior Ministerial capacity. He knew from experience that within the Ministry, while those who served it had all the obligations of looking after other industries besides coal, the bulk of their time was taken up with the coal industry. They should all be very pleased that at this stage Mr. Wood was the Minister of Power. Mr. Robens thought Mr. Wood had rather a soft spot for the coal industry. As chairman of the NCB, Mr. Robens was accountable to the Minister of Power, who in turn was accountable to his Cabinet colleagues. They had in the present Minister a man who understood the coal industry's problems, who was objective about them and who, one was sure, was anxious to help the industry in the tremendous drive it had on at the present time. One could assure the Minister that he had in this vast coal industry, the biggest industry in the country, men who were prepared to dedicate themselves to efficiency and prosperity.

At this stage in the proceedings Mrs. H. H. Wilson presented the Futers gold medal to Mr. J. Sheldon; and the Commodore King golf trophy, which was won this year by Mr. James Haynes (who was unable to attend the dinner), to his general manager, Mr. T. Scrimgeour, who received it on his behalf.

Mr. W. Duncan, of the Scottish Branch, in a tribute to the president and Mrs. Wilson, said the branch was very proud of them. They had done very special work to make the conference a success, and he asked Mrs. Wilson to accept a small gift as a memento of a very happy occasion and a very happy conference.

Mr. Wilson expressed his and Mrs. Wilson's thanks to the Scottish Branch.

He then invested his successor, Mr. Hiscox, with the presidential badge of office, and paid tribute to him as a good friend and a staunch supporter of the association. He was the production manager of a very important Area in Wales, and one was quite certain that the association had done a good thing in appointing him as president for the ensuing year.

Mr. Hiscox, who was warmly applauded, presented to Mr. Wilson a past-president's badge, which, he said, would in the years to come bring back many memories, particularly of the conference in Edinburgh in 1961.

Mr. H. E. Tyson, who described himself as the immediate past-president once removed, proposed a toast to the immediate past president, Mr. Wilson, and to Mrs. Wilson. He said the attendance at the conference was sufficient evidence of the fact that they were held in the highest esteem.

The ladies accompanying members to Edinburgh had their own special programme. Tuesday was taken up by a tour to North Berwick, where lunch was by invitation of the Mine Safety Appliances Company, Limited. Tea was taken at Lennoxlove House by invitation of Crawley Industrial Products, Limited. On Wednesday, the ladies took part in the cruise down the Clyde, where Scottish high tea was served by the kindness of the Cementation Company, Limited, and on Thursday they lunched at Gleneagles by invitation of Joy-Sullivan, Limited.

Aid for India's Coal Industry

NEGOTIATIONS have been completed in New Delhi between the National Coal Development Corporation of India and an official team from Poland for large-scale Polish help to the public sector of India's coal industry. Polish experts will operate a public-sector mine in Jharia for several years, during which time they will help Indian technicians to become familiar with modern practices. Poland will also set up at Jharia a coal washery with an annual capacity of 2,700,000 tons.

Similar assistance to State-owned collieries in India has also been offered by the UK, the US, the USSR, and France. Negotiations with these countries are continuing. A Russian delegation has already arrived at Ranchi, the official headquarters of the National Coal Development Corporation, to make a final decision on the Korba coalfields. The Russians will build two large coal washeries, one at Kaohara and the other at Karanpura. The necessary credit for the Kaohara washery has already been allocated and that for the other is under discussion.

The negotiations with the United States will enter the final phase in July, when a delegation of American coal experts arrives in India. The US experts will work an open-cast mine at Ramgarh and will set up a coal washery there.

The UK will help in working a number of deep, gassy mines near Bokaro, while France may lend a helping hand in working some "difficult" mines in the Karanpura area.

A New Gummer Bar

RESPONSIBLE for the invention of a new gummer bar designed to prevent breakdowns through the bar becoming strained and the drop arm twisted are Mr. G. Shepherd and Mr. S. Machin, mechanics in the National Coal Board's East Midlands Division. The gummer bar extends under the kerf and parallel with the cutter jib, so as to hold the gummings made by the cutting jib up to the revolving chain and allowing the cutting chain to carry the gummings out of the undercut.

The component parts consist of a top strap straddling the cutting machine and held in position by two large dowel pins through holes in the upper plate of the cutter, and a vertical drop arm slotted into the top strap at its upper end and into the gummer bar at its lower end.

The gummer bar is hinged and a shearing pin inserted so that if the bar strikes an obstruction or is subjected to undue strain the pin shears and the bar swings back from under the cut in a few minutes. A new shearing pin is inserted and the gummer bar ready for use again.

AN AGREEMENT for the supply of equipment worth about Rs. 12,000,000 for the establishment of a briquetting plant at the Neyveli lignite project in Madras State has been signed between the State Electricity Commission of Victoria, Australia, and the Neyveli Lignite Corporation. Shipment of the equipment is expected to be commenced very shortly and to be completed before the end of the year.

Mr. Alfred Robens

IMPROVING EFFICIENCY in COAL MINING

NCB Chairman's Address to Colliery Managers

The greatest threat to the future of the coal industry was the consumers' fear of rising prices, Mr. Alfred Robens, chairman of the National Coal Board, told colliery managers at their Edinburgh conference. Price stability was essential, which meant that all increased costs must be paid for by increased productivity.

AN enthusiastic audience of 450 mining engineers from all parts of the United Kingdom applauded Mr. Alfred Robens when he gave a closing address to the annual conference of the National Association of Colliery Managers in Edinburgh last week.

In a fighting speech which gained vociferous applause, he said it was absolutely essential for the industry to ensure price stability, and that meant that all increased costs must be paid for by constantly rising productivity. Could it be done? The answer was an emphatic "Yes," provided management and men realized the facts and co-operated in improving productive efficiency. Failure to do so, would inevitably mean a further contraction of the industry in the face of intense competition from oil.

Responsibility of Management

Mr. Robens said it was a distinct pleasure to him to have the opportunity so early in his chairmanship of the National Coal Board to address what was perhaps the most important conference that took place within the industry. He was glad the association had decided to take "Safety" as the theme of its 1961 conference. While safety had always been in the minds of those responsible for management in the coal-mining industry, as the years passed and techniques changed, policy must change, too.

The responsibility upon management was heavy. Accidents happened, and it was the responsibility of management to remove the causes of them. Management had also to recognize that there must be persistent propaganda for safety. It was of no use having a conference dealing with safety, as the association had done, unless it were followed up in a big way. He had listened to the papers presented to the conference, and he felt that the National Coal Board should back up the conference, so that the work that had been done should bear fruit. When he returned to London he proposed to invite his colleagues to make 1962 a National Safety Campaign Year, and to put behind it all the effort, all the organization, that they could provide, both nationally and divisionally.

The industry had immense problems of its own in relation to safety, and as it moved into the mechanization era—"we have only scratched the surface of it yet," said Mr. Robens—it needed all the resources the board could provide. He invited the manufacturers and suppliers of mining machinery, in designing and building their machines, to recognize that safety was of paramount importance. He hoped the board would have even closer working relations with the manufacturers and suppliers and that a greater safety factor than ever before would be achieved.

Machines and Men

He did not believe it necessarily followed that increased mechanization should create unsafe conditions. The East Midlands Division, the most highly mechanized division in the country, where the proporton of coal power cut and loaded was 68 per cent. and the output per manshift overall was higher than anywhere else in the country, had the lowest accident rate in the country. What could be done there, despite the differences in geological conditions, could be done elsewhere.

However, it would not be appropriate for him to lecture to his audience. He was satisfied that

everyone in management understood thoroughly the board's general desire in this matter. The safety of the men was of paramount importance. There had been experts addressing the conference and experts listening to the experts, and it would be useless for him to try to gild the lily.

Turning to a consideration of the future of the industry, Mr. Robens began by voicing the very simple philosophy that it was of no use producing coal unless they could sell it commercially at a profit.

That was the board's purpose and its statutory obligation. But when the statute was written the circumstances of competitive industry were vastly different from those of today. There was no mention of imports, because the legislators of that time had never thought there would be a shortage of coal in the United Kingdom. Today the industry fought for the first time in its history the keenest competitive battle that any commercial enterprise, in his opinion, had had to face during the present century. Oil, natural gas, and liquefied methane could now come into this country at prices which had meant in the last few years a serious diminution of coal sales. No one could think in terms of the three years from 1957 to 1960 without recognizing that a great change had come about for the coal industry.

The industry's marketing intelligence was pretty good. He was thinking in terms of the big steam raisers—those who were, in fact, contemplating turning over to the use of oil, those who had already decided to turn over to oil, and those who were in process of considering the economics of oil versus coal. Very obviously the board did not propose to publish the details. But it alarmed him when he thought of the millions of tons of coal which were at the moment at risk.

The Importance of Price

And so he came to another simple statement. If the coal industry were to remain of its present size, as in his view it ought to do—because of the necessity for job security, with advantage to the young people who were coming along, advantage to the nation in respect of balance of payments, and the political advantage to the nation in using its indigenous resources—in the economic climate laid down firmly by the Government, that there must be free competition between the fuel and power industries, they could not afford to raise the price of coal again. Without price stability the industry would inevitably contract.

In commercial talks with the big buyers of coal in this country he had found that, while they were interested in what he had to say about the intention to maintain stability of coal prices, there was lack of confidence about the industry's ability to do so. The only way to restore confidence to consumers was to write a two- or three-year contract for the supply of coal at reigning prices.

They must try, year by year, to improve the rewards to those who served the industry—men, managment, and administrators. It was not a highly paid industry, bearing in mind the responsibilities and dangers involved. The rewards were nothing to write home about, compared with those in some other industries less important than coal mining, and certainly less in size and responsibility. There were many in the industry who would leave mining tomorrow for more money; but there were others who stuck to it because mining was in their blood and in their bones. The rewards must come. The industry would be faced inevitably with increases in the costs of materials; so that if they were to have stability of coal prices they must be able to absorb the increases of their costs.

The industry had the capacity so to organize its affairs, to raise its productivity, and to improve its product, that it could absorb rises in costs, give price stability, and enable its marketeers in the commercial world to write long-term contracts. "That is the only way to convince the big buyers that we mean what we say," Mr. Robens commented.

Manpower

They needed mechanization for another very good reason. In an industrial society such as this country, with its standard of living rising year by year, and when the markets of the world would be crying out for more and more capital and consumer goods, which would in turn call for a vast increase in the labour force, he did not believe that over the years they could look forward to getting the manpower that they were able to obtain in the years that had passed. Whether they liked it or not, they would need either to contract the industry or to mechanize it in order to make up for the manpower that they were not going to get.

Since the end of 1960 the industry's manpower had fallen by 9,000, at a time when in the divisions where men were urgently needed every possible method of recruitment had been used. Therefore, mechanization was the key to price stability, it was the key to the maintenance of an industry of the kind he envisaged, and it would enable them to accept the lower manpower year by year. That was the reason why in this year they had the biggest mechanization programme the industry had ever seen; 400 new machines were going into the pits this year, with one object in view, to raise the percentage of coal cut and loaded by machines from 40 to 50 per cent. The number of machines was limited only by the ability of the manufacturers to supply them, not by unwillingness on the part of the NCB to provide the industry with the tools it needed. They had to assess the capacity to put machines in for 1962, 1963, and 1964.

They meant to have a mechanization programme in deed as well as in will.

But there was still something more to do. There had to be in the industry a much better deployment of the labour underground and on the surface. A disappointing feature of the mechanization campaign so far had been that, while they had increased the output per manshift by 3 cwt. at the face, the o.m.s. overall had increased by only ½ cwt. The latter figure should have been at least 1 cwt.; the increase in the overall o.m.s. should

be at least one third of the increase of output at the face. There might be all sorts of reasons; but it was not reasons that mattered, it was objectives which must be achieved if they were to have price stability and to maintain the industry at its present size.

The industry could not afford to invest vast sums of money in machines unless they were fully operated. There was an investment of about £100,000 for a 200-yd. face. They could not afford to spend that money and to work machines as they were worked today, at a national average of 3 hr. per shift. They had got to have a greater utilization factor.

"In spending all this money we have got to change some of our ideas about mining," said Mr. Robens. "We cannot have these expensive machines working on only one shift per day, for they will not pay their way; we should be moving to two shifts per day and, where possible, geological conditions permitting, to three shifts per day."

What were the latest figures in this field? They had 700 machines operating on a single shift, 580 on two shifts, and only 90 on three shifts. That situation had got to change very radically, said Mr. Robens.

There were tremendous responsibilities resting upon managers. It must not be thought for a moment that he regarded the task as easy; he had enough experience of industrial relations to appreciate what a difficult problem it was to get people to change from what they had done all their lives to something new. But that must be done.

He believed it was for the National Coal Board to provide for the managers the tools with which to do the job, and the freedom to manage.

Book Review

Coal. By Wilfrid Francis. 806 pp. Edward Arnold (Publishers), Limited, 41, Maddox Street, London, W.1. £7 7s.

THIS new and considerably enlarged edition of Dr. Francis's well-known work has been prepared to meet a need for treatment of certain aspects of this fairly wide subject not fully covered in the original 1954 edition.

Because of the recent emphasis on the physical side of coal science, and particularly on the application of physical methods to the resolution of the structure of coal, these aspects have received special attention in the new edition. In the section on terminology, classification, and petrology, the post-war activities of the international committees established to co-ordinate work on these subjects have been reviewed. This review includes an appraisal of the new terminology of petrology, of the ECE classification, and a comparison of the latter with the NCB code-number classification. In these, and in many other sections, major changes and additions have been made to the text of the first edition. Minor additions, designed to assist younger students of coal in the understanding of subjects of a rather specialized character, include short summaries of the nature and life cycles of bacteria and fungi, with the effects of environmental conditions, such as moisture, redox potential, and hydrogen ion concentration, on the decomposition of plant debris by these agencies.

Every one of the 12 chapters has been revised in the light of an appraisal of relevant literature published over the past several years. The book is exceedingly well produced and the profuse photographs and other illustrations are among the best of any the reviewer has seen.

Although this is not, of course, specifically a book for the mining engineer, there is much in it that will be of considerable value to the mining student during his geological and chemical studies. Particularly will he find helpful the excellent bibliographical references at the end of each chapter and the very comprehensive index at the end of the book. Much of the material is for the specialist, but even the general practitioner—in this context the mining engineer—will find Dr. Francis's work of interest. Although expensive, the book is value for money.

FORTHCOMING EVENTS

JUNE 27

Combustion Engineering Association (North Western Region):—Meeting at the Engineers' Club, Albert Square, Manchester, at 2.30 p.m. "Shortcomings in Present-day Equipment," by Prof. M. W. Thring.

JULY 3

Southern Counties Institute of Mining Engineers:—Visit to the Ford Motor Company, Limited, Dagenham (Essex).

JULY 17 and 18

Institution of Mining Engineers:—Junior section meeting in Nottingham.

JULY 19-21

Institution of Mining Engineers:—Summer meeting in Nottingham.

National Association of Colliery Managers

JULY 5

North of England Branch:—Meeting at 6.45 p.m.

EXTENSION OF the blast-furnace wharf at Whyalla, South Australia, began in February, 1960. This lengthening of the present wharf and approaches by 470 ft., the increased crane capacity, and added amenities for wharf labour are to meet future shipping needs attendant on the projected steelworks.

NEW GRADING SYSTEM FOR METAL SHEETS

WHILE faults, such as pinholes, off-gauge, and poor surface finish of continuous steel strip, are detected during inspection in the length, the sorting into grades can only be done when the strip has been cut into individual sheets. A new quality control system has been devised by the Metal Industries Division of the English Electric Company, Limited, in the form of a sheet-metal classifier designed to sort sheared sections of cold strip and to reject faulty pieces.

The classifier stores the information on strip quality obtained at the time of inspection and uses it when the sheet is cut and ready for sorting into piles. The information is stored and processed by "Datapacs," standard transistorized logical elements.

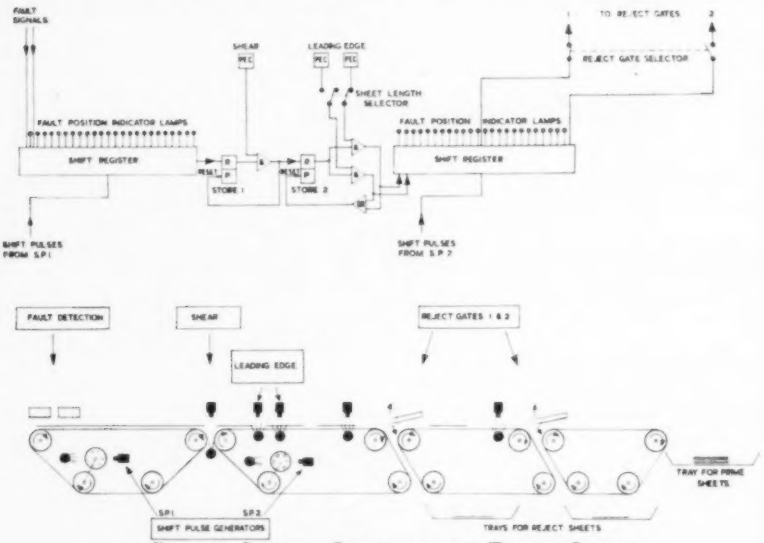


DIAGRAM SHOWING OPERATION OF A TYPICAL SYSTEM.

From these standard elements a sheet classifier system of any size and complexity can be built, for a line of any speed and with cut length ratio of as much as 10/1. The first units will shortly be installed on No. 5 cut-up line at the Abbey Works of the Steel Company of Wales, Limited, and on two cut-up lines at Richard Thomas & Baldwins, Limited, Ebbw Vale. A further unit is to be installed in a South African steelworks.

The unit at the Abbey Works will be on a steel line operating at 700 ft./min. with cut lengths ranging from 40 to 180 in. Sorting will be into rejects and prime sheets. On two tinplate lines at Ebbw Vale, both operating at 1,000 ft./min. and with cut lengths ranging from 18 to 42 in., sorting will be into four piles:—(1) Sheets with pinholes; (2) off-gauge material; (3) other rejects, and (4) prime sheets.

A simplified working model of this system was shown at the recent Electrical Engineers' (ASEE) Exhibition in London.

The "Datapac" standard logical elements are in the form of standard plug-in packages. Each package contains a number of elements capable of performing a specific logical function, *e.g.*, shift register, "and" gate, store, etc. Each element can operate from the output of the preceding element so that a series of elements can be made up to form any desired logical system.

Sheet faults detected by the instruments are stored in the first shift register at a point corresponding to the instrument position. Shift pulses timed to the conveyor movement are applied to the register so that the fault signal moves within it in time with the movement of the faulty section of strip on the shearing line. The signal transfers from the register to "store 1" when the fault passes the shear position. This then indicates that the next sheet to be cut is a reject.

When a sheet is cut this is detected by a device which causes the signal to be transferred from "store 1" to "store 2." This indicates that the last sheet cut is reject. The leading edge of this reject sheet is now detected by one of the leading edge detection photocells and transferred to a suitable position in the second register. The signal of the reject sheet is then shifted within the second register so that it appears at a reject gate just before the leading edge of the sheet reaches the gate.

The signal is used to prime the gate control to reject the sheet when its leading edge reaches the gate photocell.

Two leading edge photocells are used after the shear to cover the range of sheet lengths used. One is used for short sheets, the other for long sheets. Either photocell is suitable for sheets of medium length.

Selection of the photocell is automatically done by the shear cut length setting. Normally, mechanical reject gates are used, but more complex methods, such as overhead magnetic conveyors with variable drop-off points for the piles, can be operated with the new system.

BISRA STEELMAKING CONFERENCE

Practical Factors Influencing

The Rate of Slag Formation

and of SLAG/METAL REACTIONS

by D. HADFIELD

(*Colvilles, Limited*)

This is the fourth paper presented at the 55th BISRA Steelmaking Conference, held at Harrogate on October 12 *and* 13, 1960. *The earlier papers were published in our issues of November* 18 *and December* 30, 1960, *and April* 21, 1961.

SCARCELY any subject gives more scope for heresy than that of slag formation and slag/metal reactions in steelmaking. One of the principal difficulties is that of communication between those concerned with the theory and those concerned with practice, between the physical chemist and the skilled steel smelter standing in a canvas apron with a pair of blue glasses before his furnace. One can seldom achieve identity of outlook on this subject with a single mortal. On any particular aspect the other fellow may be right—or he may be wrong. What is often most important and most instructive is not so much the views he has, but his reasons for holding them.

This paper will be coloured by experience of open-hearth furnaces, and particularly hot-metal practice. It will not contain formulae, equations, or statements about activities, reactivities, and so on, not because they are unimportant, but because there are other aspects which have attracted less attention than they deserve. In operating a furnace the difficulty is not so much to determine what are the equilibrium conditions of the constituents present, but how fast they can be approached.

Three Objectives

What does one try to do in an open-hearth furnace? There are three objectives. The first is to inject heat into the charge as fast as possible, so as to raise it to the right tapping temperature. In the early stages heat is transferred directly from the flame to the solid constituents of the charge. Subsequently it passes from the flame to the molten bath through the slag. The second is to supply oxygen into the charge as fast as possible, partly from charged oxides and partly from the furnace atmosphere, so as to oxidize the maximum amount of silicon and phosphorus and the right amount of carbon. The first of these objects is thermal, the second is chemical, and the third is a bit of both, namely to flux the required amount of lime as soon as possible, so as to "hold" sulphur and the oxidation products of silicon and phosphorus.

It is important to insist on doing everything as quickly as possible. Oxygen steelmaking has finally, it is hoped, done away with the notion that good steel like good wine has to be matured slowly.

Now the usual model of the gas, slag, and metal phases takes the form of a sandwich with a nice even slice of ham in the middle, that is, the slag. In this model the transfer of oxygen and heat from gas to metal is by convection through a fluid layer of slag. If this were true then one can be sure that the open-hearth process would be unworkable. Consider the situation where these circumstances occur. The furnace has melted cold, low in carbon and high in sulphur. The slag is high in iron content and is basic enough to absorb all the necessary sulphur from the metal. It is also fluid enough to allow convection, but the carbon boil has petered out, with the result that the metal absorbs no heat from the flame and the slag absorbs no sulphur from the metal. Add a few tons of pig-iron to stir up the bath, and the metal loses enough sulphur and gains enough heat for tapping. It is all a question of agitation, and that is the point which must be emphasized.

The twin keys to slag control are fluidity and agitation, but agitation is the more important. In the case described above the fluidity of the slag was of no avail so long as the bath was undisturbed. On the other hand, if the bath is active enough the metal reacts with the slag, the slag reacts with the gas phase, and, indeed, the metal also reacts directly with the gas phase, however viscous the slag may be. In the hot-metal process, the siliceous slag which forms soon after addition of the hot metal is strongly foaming and would act as an efficient insulator if it were not for the violent jumping of the metal through the slag. This enables the fuel flow to be maintained and oxygen to be picked up from the gas at a stage when, in a cold-charged furnace, the fuel would have had to be reduced owing to reduced movement of the bath.

Starting Point of Slag Control

These are generalities which in slag formation, as in most subjects, only take one so far. It hardly needs to be stated that no two charges work alike and all must be treated differently. The more one studies slag formation and control of the subsequent reactions, the more evident it becomes that the starting point has to be the start of charging. For in slag control nothing succeeds like success. If the furnace is charged correctly it forms its slag and conducts its reactions almost unaided. So much so that the whole process appears deceptively simple. This is, of course, why one learns so little from watching a good operator, and so much more from a poor one, who will demonstrate in time all the pitfalls which he should have avoided.

It is perhaps an overworked platitude that proper slag control requires proper balancing of the charge. Yet too often elaborate methods of slag control are developed to compensate for slipshod methods of charge accountancy. The aim must surely be to make every charge as nearly as possible like the one before, so that steelmaking is akin to shelling peas. One cannot hope to maintain absolute consistency in charging, but this is no excuse for not ensuring it where possible. It is well known that if one charge gets nothing but heavy scrap and the next one nothing but light scrap, both are likely to lose time, if nothing worse. Are melt-out conditions so erratic that it is simply not worthwhile correcting for, say, the varying analysis of the hot metal? That would be a counsel of despair if ever there was one.

The problem of balancing the charge is not so much one of physical chemistry as of what today would be called operational research. A charge is not often made up from first principles, but normally from experience of many preceding charges. It is usual to standardize the scrap charge and adjust for the hot metal as far as possible. But having done all this it may be found that on account of factors not allowed for, some charges have had too little lime and some have had too much. If no greater consistency can be achieved it is a question of determining the relative disadvantages of too little and of too much lime, and altering the normal charge accordingly. Suppose it is decided that as much harm is done by one charge with excessive lime as by two with a deficiency. Then the normal weight of lime charged must be adjusted until in practice twice as many charges prove to have too little as have too much. At Colvilles' Ravenscraig Works the best balance is believed to be one in which the average charge requires one box of ore to be fed, but only one in every five charges or so requires a box of lime.

Charging Method at Ravenscraig

There need be no apology for saying so much about charging because it is the essential to good slag control. The importance of the charging procedure can be well illustrated by the normal method of charging at Ravenscraig, even though this may well be inapplicable to any other melting shop. Needless to say, the method is the result of trying many others, and no doubt others will be tried in the future. The main features of the furnaces are that they are fixed, are charged with 60 per cent. hot metal of about 0.7 per cent. P and 0.7 per cent. Si and tap about 250 tons of ingots. The firing rate during charging is 720 gal./hr. of fuel oil and the roof is of silica. The importance attached to the need for agitation in operating a furnace leads to the specification of not only how fast to charge the furnace, of not only the best sequence of the different materials, but also of their position in the furnace.

The cold materials to be charged, including limestone and ore, amount to about 160 tons, and if these are all charged as fast as possible they cannot be heated fast enough with the silica roof. The obvious solution is to charge the cold materials steadily, but slowly enough for each layer to be well heated before the next layer covers it. This might be satisfactory if only scrap were being charged, but to heat a pile of ore by playing a flame on the outside of it is a very slow procedure, and the surface of the pile can be dripping while the interior is black. It has been found that to get heat into the ore it is necessary to agitate it, and that the best thing to agitate it with is a liquid. Hence the sequence of charging is as follows.

First 10 to 20 tons of plate scrap are spread all over the bottom to prevent the limestone, which is charged next, from sticking to it. The limestone is also spread over the whole area of the furnace so as to be easily accessible to the liquid as soon as it forms. The ore, on the other hand, is not spread because with its high content of fines it would form an insulating blanket over the bottom, and would also tend to freeze the first liquid which forms. Instead, the ore (about 35 tons of it) is built as a ridge along the centre line of the furnace. By leaving the front and back of the furnace free of ore, the scrap charged subsequently can form liquid pools here which heat the ore pile by attacking it from either side.

The ore is followed at once by 30 tons or so of light scrap which is charged all over the furnace, and 20 to 30 tons of heavy mill scrap which is perched on top of the ore pile in the centre of the

hearth. In this 110 tons or so of cold materials the active ingredient is the 30 tons of light scrap, which soon melts, and attacks the limestone from on top, the ore from either side, and the heavy mill scrap from below.

If the next instalment of materials is charged too soon the amount of liquid which has formed is too easily chilled and solidified, and is much more difficult to melt a second time. The same is true, of course, if too much scrap is added at once. For these furnaces it is found that 30 tons is as much as can safely be charged at a time once the liquid has formed, and that it must be delayed until about half an hour after the first materials are in the furnace. So to complete the total quantities of cold materials about 25 tons of scrap are charged followed half an hour later by 25 tons of cold iron. As far as possible, these materials are placed along the centre line of the furnace on top of the ridge of ore, so as to be directly exposed to the flame, and so as not to chill the pools of liquid along the front and back of the furnace.

This careful timing and careful placing of the materials in the furnace may appear amusing to those who have difficulties in getting the materials into the furnace anything near as fast as they can be melted. However, when provision has been made to overcome such difficulties as at the Ravenscraig plant it is essential that these considerations should determine the method of charging. The best practice will be different for every furnace, but it has to be established if the slag is to be formed as early as possible and consistently from charge to charge.

Once the cold materials are in, the addition of hot metal must be made at just the right moment. Until it is, as much fuel is carried as can be burnt in the furnace chamber. Quite apart from the need to inject heat into the cold materials as fast as possible this helps to calcine and flux some of the limestone and form a slag even while there are not many metalloids in the bath. Now before hot metal is added it must be remembered that the hot metal is perhaps 100 to 200 deg. C. colder than the liquid already present in the bath, and if it is added before enough liquid has formed, can partially set it. The best time to add the hot metal to the Ravenscraig furnaces is found to be when about half the area of the bath is liquid.

If the hot metal is added too soon the bath is relatively cold; therefore, it is relatively inactive. Therefore, it picks heat up slowly. Therefore, it remains inactive. The vicious spiral has set in. If the hot metal is too late the ultimate delay is less, but the consequences can be more severe. The slag is so over-oxidized that the reaction with the hot metal causes violent foaming which if it cannot escape from the doors can do so over the hobs and into the slag pockets.

The main purpose in describing one particular charging practice is to illustrate the number of factors which operate at this stage and which can be controlled so as to affect, among other things, the formation of the slag. If one does not try to control or standardize these factors they still have just as much effect on the formation of the slag, but, of course, in an erratic manner. Just as no politician is a free agent, but is in part at least the prisoner of history, so it is with the melter who inherits a furnace charged by his predecessor.

Control of the Charge

Once the furnace is charged the melter has so few weapons at his disposal for controlling it that he can do little but adjust the flame. The fuel flow usually has to be reduced, because it is supplemented by carbon monoxide generated in the bath. With this limitation the more heat that can be carried, the better: the more heat the faster the reactions proceed and the more lime is fluxed to digest the products of reaction. Conversely, the faster the reactions proceed, the more active the bath and the more heat it will accept.

There is also another reason for carrying as much heat as possible. For certain practices once the surface of the bath is largely molten the flame should be lengthened to cover and heat the whole surface. However, for the Ravenscraig furnaces trials show it is better to keep a short flame, as in charging, for much longer—certainly until refining starts. Perhaps this is because of dissociation of the extra steam required to keep the flame short, but probably a better explanation is that this effect results from the jetting action of the flame on the bath, which at the incoming end strongly agitates the bath into accepting more heat and more oxygen, even though the outgoing end of the furnace looks, and is, comparatively dead.

Though the operator has few controls at his disposal, once the furnace is charged, he has, if he is fortunate, the possibility of flushing the slag, and normally the more the better. However, the moment of slag flushing is critical and can vary widely for different practices. Of the major impurities in the burden the slag absorbs first the silicon, then the phosphorus, and lastly the sulphur, with, of course, considerable overlapping of these three functions. Since in the end practically all the silicon is removed into the slag the time for flushing is determined mainly by the relative specifications for phosphorus and sulphur and the difficulty in achieving them. If one flushes early, during or just after the addition of hot metal the flushing slag is too acid to remove much sulphur, so that nearly all the sulphur to be eliminated has to be absorbed by a reduced weight of tapping slag. If one flushes later—and with fixed furnaces this is limited by the length of time for which the slag stands high enough to be flushed—the whole steelmaking process is delayed by the extra insulating effect of a thicker slag blanket.

Though it is very important from a technical, and ultimately from a cost, point of view to determine the best time for flushing, taking account of different possible lime and ore requirements, loss of iron into the slag and many other factors, these are hardly relevant here. What is relevant is that the thicker the slag blanket at any stage the greater the likelihood of having to reduce the fuel and

thereby slow down all the reactions. This was evident in a trial in which for 12 charges, contrary to our usual practice, all the slag was deliberately kept in the furnace until tapping. Though this achieved the object of reducing the sulphur in the steel at tapping, it did so at the expense of half an hour of furnace time, 250 gal. of oil and 8 tons of limestone—rather a high price to pay for an exercise in physical chemistry.

Refining

The objective after the furnace is charged is to maintain the fuel flow as high as possible. However, the time comes when lime rises into the slag faster than it can be fluxed, and the slag consists of lumps of lime interspersed with liquid slag which is only just fluid. In certain practices the time of "Lime Up" is very well defined, and is referred to by some people as melt-out, though, in fact, the whole of the solid charge has not normally been melted at this stage. To continue fluxing the lime one must maintain as much heat as possible, but the slag is so viscous that it transfers the heat to the metal more slowly, and is liable to reflect the heat to the roof and damage it. It is only at this stage that the use of fluorspar or other fluxes is justified. If spar is added too early while the slag is still rather acid, it accentuates the tendency to foam and hinders rather than helps the solution of the lime which floats into the slag later.

This stage of the process is one which particularly requires to be watched, and which can be most misleading. The slag may be thin and watery and so acid that it does not even absorb the lumps of lime which float about in it. Or again the charge may be so hot and the slag so acid that it stands up like a thick foam, which almost completely stifles both oxygen transfer and heat transfer. Or the charge may be so cold and the slag so acid that it stands up in just the same way. Nor is it always easy to distinguish the two cases.

The ailments of slags spring from the past history of the charge. Prevention is better than cure. If the charge is well-balanced and well-charged it will form a healthy slag without much difficulty. Too little is known, certainly in quantitative terms, about this "in-between" phase when the charge is not fully melted and when it is stirred up neither by the ore boil which has already subsided nor by the carbon boil, which has not yet begun. The charge is gaining heat, but sometimes quite fast and sometimes very slowly, for reasons which one cannot always identify. It is almost with a sigh of relief that one takes the first sample and the first immersion temperature, preparatory to feeding ore.

There are those who feed no ore until the bath is clear melted, for fear of delaying the completion of melting. They also argue quite rightly that one of the main problems is to make the slag more fluid and that fluidity depends strongly on temperature. However, the molten part of the charge can on occasion be very hot, even approaching 1,600 deg. C., before all the solid material has lifted off the bottom.

Quite apart from the waste of time in waiting for clear melt, any ore fed just after "melt" will, with the combination of high temperature and high carbon content, make the slag foam up and will check the whole process. So the extra heat and extra fluidity of the slag cannot achieve its object of accelerating the reactions.

Besides, if ore is fed it should not have the full cooling effect which physical chemistry would suggest. When ore is fed, the stirring effect on the bath is such that it can accept more heat from the flame, so that the fuel can be increased without damage to the refractories.

At Ravenscraig it is found that it never pays to feed ore until the bath reaches 1,500 deg. C., and then only if the carbon content is 1 per cent. or more. The lower the carbon content the higher the temperature required before the bath can be fed with ore, on account of the shape of the iron-carbon liquidus curve. There are several systems, all similar in principle, for deciding from the temperature and carbon content whether ore can be fed. What is surprising is how consistently such a system gives the right answer.

Another point also emerges. There are those who, far from waiting until "clear melt" before feeding ore, will tell you that "clear melt" is of no particular importance. Results from many charges show on the contrary, that if two charges have the same carbon content in the bath, one which is not melted requires to be 20 deg. C. hotter before it can accept ore than one which is melted.

Once the bath is hot enough it is possible to feed lime as well as ore. Again there are several systems for determining how much lime will be needed before tapping, and the practice on the point varies widely. The policy at Ravenscraig has been stated, namely, to charge enough limestone so that only occasional charges need lime fed at all. At the other extreme there are those who charge only one third of the total lime requirements initially, and feed the other two thirds during refining. It would be interesting to know how it is is done. At Ravenscraig it is found that however much scale, ore, or fluorspar is added with the lime it is not possible to add even one quarter of required lime during refining without delaying the furnace. Not only so, but the slag sometimes becomes so viscous that it absorbs no more sulphur than if no lime were fed and the slag remained more fluid.

A box of lime is more easily dissolved if it can be followed by a box of ore a few minutes later. But in the practice described this would be only a partial solution because it is the aim to feed, on average, only one box of ore per charge. In any event it is found that the only disadvantage of charging nearly all the limestone is that sometimes a charge proves to have had too much and it cannot be taken out.

Carbon and Temperature Relationship

Fig. 1 shows the relationship between carbon and temperature for about 40 charges included in a trial. The purpose of the trial was to achieve more consistent conditions at "clear-melt" by standardiz-

ing everything which could be standardized and adjusting for everything which could not. In particular, the sequence of charging was carefully controlled and the fuel flow was specified at the different stages of each charge. The graph shows the state of the charges 8 hr. after the start of charging. Some of them were clear melted at this time and some were not. The question is why there is such a relationship between carbon and temperature and what does it mean.

Various explanations in terms of what can be measured have been examined, but none of them is satisfactory. The best explanation appears to be that the charges at the left-hand side are those which for whatever reason were agitated strongly during charging and melting. This agitation has favoured both oxygen transfer and heat transfer, so that at the standard time of 8 hr. from the start of charging these charges have lost more carbon and gained more heat than the others and are therefore nearer tapping.

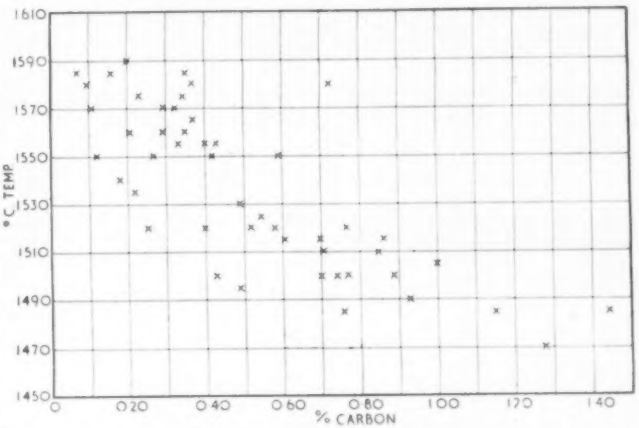


FIG. 1.—RELATIONSHIP BETWEEN BATH TEMPERATURE AND CARBON AT MELT-OUT.

It may be noted that as yet there has been hardly any mention of the word "equilibrium." However, this is not because equilibrium conditions are considered to be unimportant. On the contrary, they are very important, but quite a lot of information is available on them, usually enough for practical purposes. The process aim is not only to proceed towards equilibrium as fast as possible, but also to tap the furnace before it is reached. For equilibrium is just another name for stagnation, and stagnation is the last thing desired in steelmaking.

The aim in charging limestone, for example, is not to add just enough so that when the slag and metal reach equilibrium for sulphur the amount left in the metal will be just small enough to meet the specification. For in this, as in so many reactions, as equilibrium becomes nearer the approach to it becomes slower. Therefore, the aim is to add enough limestone to suit an equilibrium condition which is better than that required in order to meet the required specification before reaching this equilibrium, and therefore sooner. So it is desirable to know not only what is the equilibrium sulphur partition for given slag and metal compositions, but also what determines how quickly it is approached. It must be admitted that very little is known about the factors concerned.

It appears that one cannot yet measure the viscosity of the slag, yet this controls the natural convection and limits the forced convection which determines so many of the slag-metal reaction rates. The factors governing the viscosity are only known very roughly.

It appears also that one cannot measure the surface tension of slag, yet this must be a potent factor in the tendency of slags to foam. It is not known how the chemical equilibrium between slag and metal is affected if the slag is, for example, 50 deg. C. hotter than the metal. Again it is not known how conditions are affected if oxygen is passing through the slag fast enough to oxidize 20 points of carbon per hour or only 10 points per hour.

It is perhaps time to realize just how little knowledge there is on the subject of physical chemistry of steelmaking to help in the operation of the open-hearth process.

The aim of this paper has been to emphasize that the most important stage in forming the slag is the charging period, that if charging is done correctly refining will look after itself. Secondly, that the principal means of forming a slag and of getting it to react with the metal is to agitate the materials together by every possible means. Lastly, that for every reaction one must aim for an equilibrium beyond what is actually required so as to attain the actual objective within a measurable time.

"O for Oxygen"

To mark the occasion of its 75th anniversary the British Oxygen Company, Limited, has made a film called "O for Oxygen." It shows how from Priestly's discovery of oxygen in 1774 has stemmed a world wide use for oxygen and other industrial gases in industry, medicine, aviation, and scientific development. It also illustrates how the various ingredients of the air are being used to make steel more efficiently, cut ships' plates more quickly and more accurately, weld metals more strongly, to send up rockets, and to save lives. A colour film, "O for Oxygen" runs for 23 min. It is among the 15 films selected by the Federation of British Industries and the British Employers' Confederation to be included in the British entries for the Second International Festival of Industrial Films at Turin (June 25 to 28). Copies of the film in 16 mm. and 35 mm. will soon be available on free loan to schools, colleges, and similar organizations.

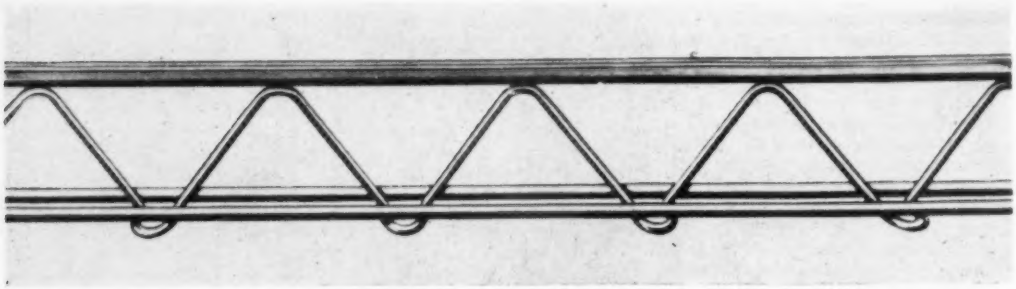


FIG. 1.—A SECTION OF A FILIGREE WELDED LATTICE GIRDER, MANUFACTURED BY HEAD WRIGHTSON TEESDALE, LIMITED, FOR USE IN FLOOR CONSTRUCTION.

FILIGREE REINFORCEMENT GIRDERS FOR FLOOR CONSTRUCTION

NEW and important method of using steel for the manufacture of reinforced concrete girders in filigree construction is now available in this country. It is the filigree reinforcement process introduced from Germany by Head Wrightson Teesdale, Limited, Thornaby-on-Tees. The method, invented by Stefan Keller and operated in Germany in 1954 by Filigranbau Stefan Keller at Munchen-Solln, employs a patented machine of ingenious design to convert continuously three steel rods and a narrow steel strip into a rigid girder of the form shown in Fig. 1.

The filigree girder machine installed by Head Wrightson Teesdale, Limited, is of advanced design, being capable of producing filigree girders in three sizes. It is the first machine of this type, although a similar "three-size" machine is now being installed in America. To date, the German company has supplied filigree girder machines to France (one and one on order), Italy (one), Australia (one), and the US (one delivered and more to follow).

Head Wrightson Teesdale, Limited, will negotiate agreements to supply filigree girders to floor constructors who are accredited to carry out design work. To date, the company has carried out tests on several specimen floors. At a recent demonstration to the Press, a floor of 23 ft. span built with 8-in. deep filigree girders and having a 2-in. concrete topping to give a total floor depth of 10 in., was loaded with pig-iron until it collapsed. This did not occur until 5.35 times the design load had been reached.

A general view of the filigree machine is shown in Fig. 2. An electric control panel and a hydraulic plant supplying oil at high pressure to mechanical pumps and valves automatically regulates the operations and sequences of the filigree machine. Localized controls permit the different production sequences to be operated individually and independently. The various manufacturing stages performed by the machine during the production of a length of girder are carefully synchronized.

Sequence of Operation.—(1) Rod, in coil form varying from $\frac{5}{16}$ in. to $\frac{1}{4}$ in. dia., is loaded on to the rotary tables by overhead handling facilities. (2) A flash butt-welding machine is installed between the turntables and the first section of the production machine and welds the end of the finished coil to the commencement of the new coil to ensure continuity of operation. The "rag" on the welded joint is buffed off to the required smoothness.

(3) A rod of $\frac{5}{16}$ in. or $\frac{1}{4}$ in. dia., dependent upon the depth of girder in production, is fed from the turntables through a series of straightening rolls mounted on top of the first section of the machine. This rod will be formed into the diagonal of the filigree girder.

(4) Two rods varying from $\frac{5}{16}$ in. to $\frac{1}{4}$ in. dia. of mild steel with controlled carbon content, are fed one at each side of the first section of the machine through two series of rollers. These two rods which will form the bottom chord of the girder are strain hardened by drawing through the rollers which are set at different levels as determined by the size of rod used. After strain hardening, the two bottom chord rods have a guaranteed minimum yield strength of 60,000 lb./sq. in.

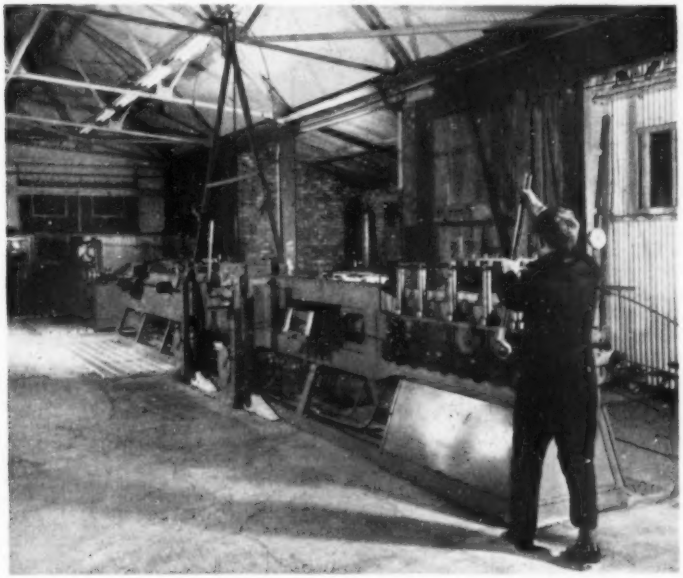


FIG. 2.—GENERAL VIEW OF THE FILIGREE MACHINE FOR PRODUCING AUTOMATICALLY A GIRDER OF LATTICE CONSTRUCTION AT THE WORKS OF HEAD WRIGHTSON TEESDALE, LIMITED.

(5) The rod to form the diagonal is then guided into a large overhead loop of controlled dimensions to provide an unrestricted feed of the rod to the second section of the machine. In this section the rod is bent by mechanically operated dies to form the horizontal "U"-shaped loop at the bottom of the girder and by a separate operation to form the diagonals of the girder. To the side of this bending and forming machine are fixed two spools to carry the coils of strip, the end of the spent coil and the commencement of the new coil are cut square and oxy-acetylene welded to provide continuity of machine operation. The strip is fed through a press die which forms it into the channel section top chord of the filigree girder.

(6) The two strain-hardened bottom chord rods are positioned one to each side of the bending and forming machine in which they are not processed. (7) The top chord, the diagonal, and the bottom chord rods are all moved forward on adjustable guides to the machine's third section where the filigree girder members, correctly positioned relative to one another, are resistance welded together.

(8) The completed girder passes through a high-speed saw, roller mounted on a gallery and onto a girder run-out structure calibrated for girder length. When the girder end reaches the length gauge stop, the saw operator cuts the girder, during which process the saw moves forward on its gallery to match the speed of the girder production line. (9) The filigree girders, cut to length, are then stacked and bundled for despatch.

The completed girders are sent to the flooring contractors, who cast a vibrated concrete plank (approximately 4½ in. wide by 2 in. deep) onto the lower girder chord.

The girder with concrete plank is sent to site where, due to its light weight and the inherent strength of its welded construction, it is easily and quickly laid in position by two men, spanning between its supports. It is usual to use temporary props beneath the girder planks at approximately 7 ft. 6 in. spacing before laying the concrete blocks: the props will remain until the *in-situ* concrete is poured and set.

Concrete hollow blocks or hollow tiles are placed one to each end of the span beneath the girders to establish the desired cross centres of the girders. This is generally 24 in. and the hollow blocks are supported on the concrete planks of the girder lower chords and placed in position between the girders, working across the floor span.

In-situ concrete is then poured in the spaces between the hollow blocks, embedding the diagonals and upper chord of the girder, the concrete plank on the girder lower chord forming the permanent shuttering for the *in-situ* concrete. The floor construction is illustrated diagrammatically in Fig. 3.

The flooring may be left flush with the tops of the hollow blocks on which the floor finishes would be laid, or concrete topping may be poured, depending upon the architectural specification or design requirements. Alternatively, after the girders with

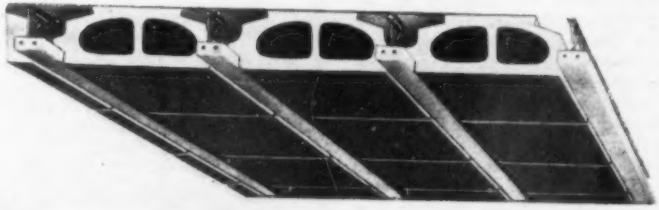


FIG. 3.—A DIAGRAMMATIC ILLUSTRATION OF THE FILIGREE GIRDER IN POSITION AND THE METHOD OF LAYING THE HOLLOW TILES.

concrete planks are positioned across the spans, quick release and re-usable steel shuttering moulds are placed in position on the concrete planks following which *in-situ* concrete is poured to provide a rib and arch appearance to the underside of the floor.

Filigree girders are produced in three standard depths of 4.6 in., 6.3 in., and 8.5 in., measured overall from top of the channel section upper chord to the underside of the horizontal loop in the diagonal rod. For changing from one depth of girder to another, it is necessary to fit new forming dies and alter the position of guides and resistance welding points. As the girders are produced by a continuous process they may be cut off to any required length, but transport conditions would limit the length to 40 ft.

Filigree girders are designed in accordance with the requirements of British Standard Code of Practice CP. 114 (1957).

Some of the Advantages

Of welded construction, the girders are strong, light and of consistently high quality manufacture. Filigree reinforcement girders are designed for use in hollow block, hollow tile, and cast *in-situ* floor constructions. At site the filigree girder with plank is a self-supporting reinforcement, providing accurate positioning for hollow blocks or tiles with which it forms a working platform. Speedier and easier construction is a further advantage.

The floor is of light weight, leading to overall economies in design, and has good thermal and sound insulation properties. Services may be accommodated within the depth of the floor. Filigree girders are available in three depths.

Huge Forging Hammer at Westinghouse Electric

A 16,000-LB. steam-accelerated forging hammer has been put into operation at Westinghouse Electric Corporation's plant in Lester, Pennsylvania. The huge machine is being used to make 40- and 44-in. long turbine blades. Blades as long as 50 in. can be forged.

Steam turbine blades must be extremely reliable. Failure of any one of the more than 9,000 blades in a typical 250-MW turbine is of major consequence, since repairs cost thousands of pounds and take weeks to perform. Although blades have always been made to exacting standards, the new machine will produce even higher quality parts.

The hammer itself, made by the Erie Forging Company, can operate at 60 strokes/min. Velocity of the ram at the point of strike is 15 ft./sec. When in continuous operation the forge uses about 9,000 lb./hr. of 110-p.s.i.g. steam. The forge has an anvil measuring 7 by 13 ft.

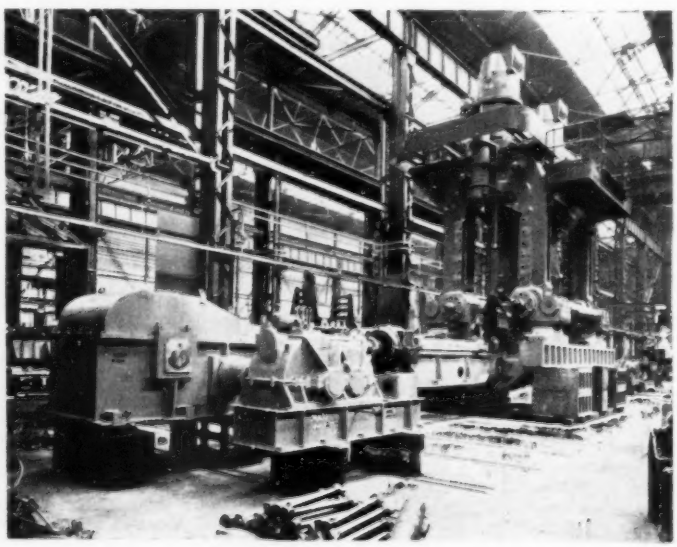
A special building was constructed to house the forge and a variety of auxiliary equipment was purchased for use with the machine. A steam accumulator, a walking-beam gas furnace, and a conveyorized salt-bath furnace are the major items of new equipment which are part of the forging-hammer installation.

WAYS IN WHICH disused chalk, gravel, and other pits (including ironstone workings) could be used for tipping household refuse without polluting underground water are discussed in "Pollution of Water by Tipped Refuse," published by the Stationery Office, price 7s.

For Samuel Fox's Extension Scheme

THIS 42-in. by 108-in. blooming and intermediate mill, seen under construction in the Bridgeton Works, Glasgow, of the Davy & United Engineering Company, Limited (a member of the Davy-Ashmore group), is being installed at the Stocksbridge Works of Samuel Fox & Company, Limited, as part of a large-scale extension scheme.

The mill will deal primarily with quality steels, producing a wide range of blooms and billets, and will be capable of rolling to a very flexible programme.



This paper, presented to the North Staffordshire Branch of the National Association of Colliery Managers on December 14, 1960, outlines a system of both transporting and bunkering stowing dirt underground, without excessive imposition on coal transport, and describes analytically a successful and economic stowing operation. An existing dirt-preparation plant, providing stowing material for the Moss Seam, is used to supply dirt to the Cannel Row Seam, working under a built-up area and in close proximity to extracted seams.

UNDERGROUND STOWING AND DIRT BUNKERING

at Holditch Colliery

by F. STEPHENS*, M.I.Min.E., A.R.I.C.S., and F. N. BARRETT†, B.Sc.

HOLDITCH COLLIERY, about 2 miles north north-west of Newcastle-under-Lyme (Staffs), is part of No. 3 Group, No. 1 (North Staffs) Area, of the West Midlands Divisional Coal Board. The two shafts, No. 2, sunk in 1912, and No. 1, sunk in 1916, are approximately 2,000 ft. deep to the stone drifts from which the working seams are reached.

Three parallel stone drifts dipping from the shafts in a south-westerly direction at an average gradient of 1 in 11 serve as intake and return airways for the Moss and Five Feet seams in the Middle Coal Measures (Fig. 1). These drifts pass through the 700-yd. upthrow Apedale fault some 900 yd. from the pit bottom and then dip at 1 in 4 and later 1 in 3 to intersect with the Five Feet Seam, 1,430 yd. from the pit bottom. Two parallel stone drifts continue then for 1,460 yd. immediately into and then in the Moss Seam to the 200-yd. downthrow Millbank fault boundary at an average gradient of 1 in 16. The Moss coal is worked in flank panels from these " in the seam " roadways.

From the Five Feet intersection at the bottom of the first or Main dip, parallel " in the seam " roadways are level for about 980 yd. in a north-westerly direction before following the Five Feet Seam up the western limb of the North Staffs syncline. Here the gradient gradually increases over 550 yd. to 1 in 3 and the Five Feet Seam is worked in flank panels from these roadways.

Service Loop for the Cannel Row

From the shafts, existing cross-measure drifts set off in a north-easterly direction to tap the Spencroft Seam have been utilized to drive and develop a complete loop of level stone roadways. This " service loop " gives intake access to the lower Cannel Row Seam by a dipping cross-measure drift. Return access is by a second dipping drift driven from the No. 2 Pit bottom. The loop still serves the Spencroft workings, but the seam is expected to close towards the end of 1960. Both seams are in the Upper Coal Measures.

The Cannel Row is to be developed beneath a built-up area and also in close proximity to old workings. The Great Row Seam has been worked extensively on this northern side of the pit and some work has been carried out in the Peacock Seam and the ironstones at the top of the Upper Coal Measures. Table 1 gives the depth and the average section worked of seams in the Upper Coal Measures at Holditch Colliery.

TABLE 1.—*Depth and Average Section Worked of Seams in the Upper Coal Measures at Holditch Colliery.*

Depth in yd.	Worked section (average).	Seam.
	ft. in.	
640	5 0	Peacock
670	4 3	Spencroft.
690	6 2	Great Row
710	3 8	Cannel Row

The Cannel Row Seam section is built up as follows:—Coal, 1 ft. 8 in.; cannel and ironstone

* Manager, Holditch Colliery, No. 1 (North Staffs) Area, West Midlands Divisional Coal Board.
† Acting manager, Glasshouse Colliery, No. 1 (North Staffs) Area, West Midlands Divisional Coal Board.

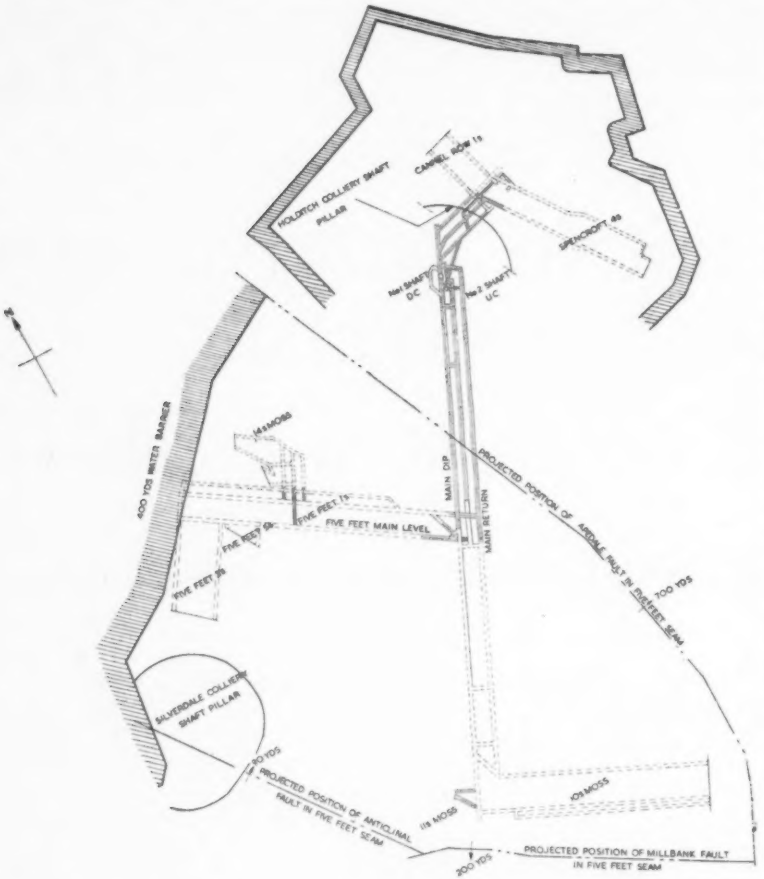


FIG. 1.—DISTRICT LAYOUT OF ALL SEAMS AT HOLDITCH COLLIERY.

balls, 1 ft. 6 in.; coal, 3 ft. 8 in.; shale, 2 ft. 8 in.; coaly shale, 1 ft. 8 in.; shale, 1 ft. 3 in., and coal, 1 ft. 3 in.

Underground Arrangements

A development scheme for the Cannel Row Seam, to include pneumatic stowing, was devised by the Area planning department and was started in June, 1958. The first district in the seam, Cannel Row 1s, was opened in September, 1959. Fig. 2 shows the development plan of the districts in the seam.

The Cannel Row districts were to have been mechanized, using Meco-Moore cutter loaders, but after a distinctly unsatisfactory trial period with the first of these machines on the first face, 1s, they had to be withdrawn in favour of hand-getting. Not only were floor and roof conditions on the face against the machine, but the thickness of the seam itself proved to be less than had been expected.

The seam output is raised by a 36-in. trunk belt in the intake drift to a loading point in the service loop. Stowing dirt is lowered to the pit bottom and put into circuit with the empty tubs and material on the loop. Material can be taken out of circuit on the first leg of the loop, called the material drift, while the empties and dirt loads are pushed by a series of three urgers to the top of a 100-ft. deep, 13-ft. dia. concrete-lined staple shaft bunker (Fig. 3). This staple shaft, at the in-bye end of the material drift, forms a vertical connection between the pit-bottom level and the Cannel Row main return. Dirt loads are tipped at this 1,000-ton bunker and the emptied tubs are returned to the circuit to be pushed by a further series of four urgers to the loading point.

From the loading point it is intended that coal loads should be handled first by a variable speed urger before being finally taken by two urgers to the pit bottom. The latter are installed, but at the moment an overhead rope is used to draw loads away from the loading point.

At present, face room in the Cannel Row Seam is limited to a single production unit and ventilation is by leakage through double steel doors at the top of the return crut, at No. 2 Pit bottom. Cannel Row 2s face has been developed and is to be opened towards the end of 1960, when the existing Spencroft face is closed.

Cannel Row 1s Face

Cannel Row 1s face is a single unit 152 yd. long. The coal is overcut by electric machine and, when tops are taken by hand to the cannel band, give a thickness varying between 3 ft. 4 in. and 4 ft. 4 in. over the length of the face.

Face support is by rigid steel props and corrugated strap bars and the face is served by a 12-in. scraper conveyor feeding a gate-end loader for

transfer on to a 30-in. gate belt which delivers on to the 36-in. rising trunk belt to the loading point.

The 14-ft. return airway, of similar size to the intake, is used as a material and a stowing level, housing a Markham stower within 300 ft. of the face. The stower is fed by a 30-in. gate belt taking dirt from a primary dirt belt, which feeds direct from the foot of the staple shaft as a distribution belt.

Surface Dirt-preparation Plant

Since stowing had been carried out for a number of years in the Moss Seam, dirt-preparation plant had been installed on the surface before the scheme for the Cannel Row was drawn up. No adjustment to the surface plant was in fact required. Fig. 4 shows the diagrammatic layout of the dirt-preparation plant.

Dirt is taken to the plant from four sources. Washery dirt is conveyed to a single dirt receiving hopper at the top level of the preparation plant. On to the washery dirt belt is delivered screens dirt and development dirt from the No. 2 Pit, thus allowing material from three of the sources to be handled by belt. Dirt from the No. 1 Pit is taken in tubs to a tippler above the dirt-receiving hopper. Here the material is tipped to join the washery dirt before the empty tubs are returned to the circuit. All empties in the pit circuit pass under a 200-ton dirt - storage bunker where the prepared dirt is stored and distributed as required.

At the foot of the dirt - receiving hopper on the top floor of the plant, a grid is used to take out grossly oversized material for breakage by hammer. The undersize from the grid passes on to an apron feed belt. This belt delivers in turn on to a short belt over which is suspended an electro - magnet. The dirt, now free of foreign iron and steel and of a size which can be handled by the crushing equipment, then passes over a vibro-shaker.

TABLE 2.—*Manpower and Cost/Ton Saleable of Surface Dirt Preparation.*

Operation.	Manshifts per turnover.	Rate.	Cost/ton all stowing.	Cost/ton to Cannel Row 1s.
		s. d.	d.	d.
Dirt tipper (1) ..	2	31 5	1.2	0.5
Cleaner (1) ..	1	30 5	0.6	0.25
Picker* (1)	2	30 5	1.2	0.5
Operator (1) ..	2	31 5	1.2	0.5
Tub filler (1) ..	1	31 5	0.6	0.25
Maintenance ..	With screens and washery maintenance			
Total ..			4.8	2.0

* Some 12 to 18 ton/week of + 2½-in. coal is picked out in the plant.

The 2½-in. undersize is guided by chute on to the bunker storage feed belt, while the oversize passes on to a short picking belt where coal, wood, and other remaining foreign material can be taken out.

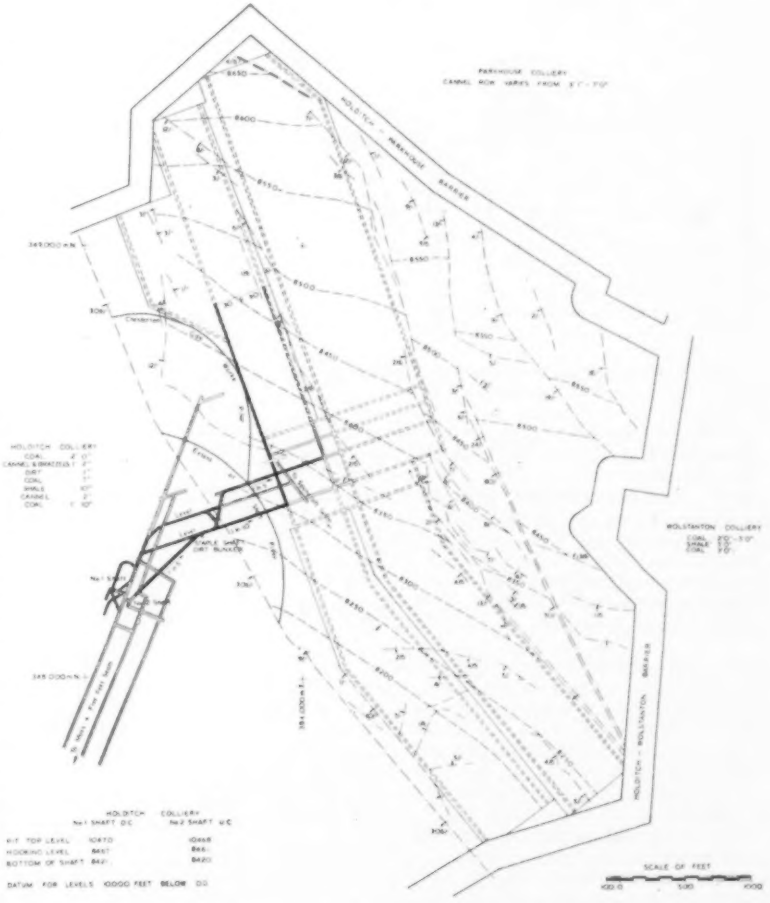


FIG. 2.—PROJECTION PLAN FOR THE CANNEL ROW SEAM.

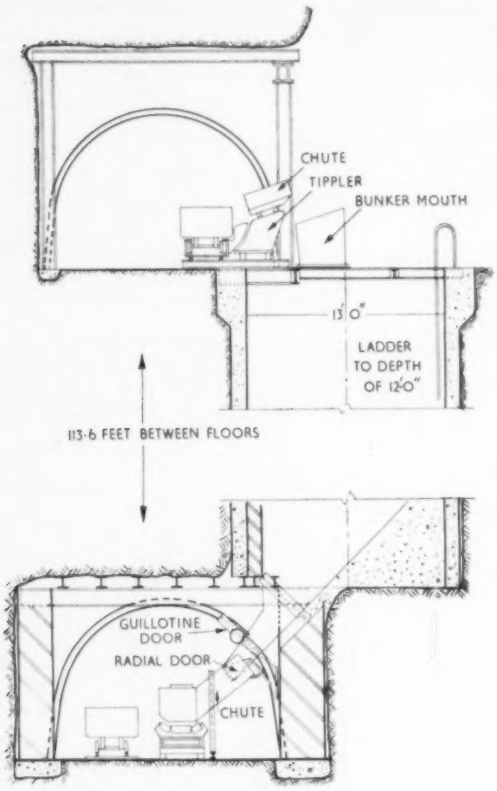


FIG. 3.—DETAILS OF THE TOP AND BOTTOM OF THE STAPLE SHAFT BUNKER.

The dirt is now crushed by a Broadbent swinging-arm crusher and the whole of the product is re-introduced to the circuit at the apron feed belt. Thus a recirculated 2½-in. undersize product is conveyed up to the top of the storage bunkers.

Manpower and costs for the operation of the surface dirt-preparation plant are shown in Table 2. Average saleable tonnage from stowing districts for apportionment of costs is Moss 10s, 1,800 ton/week and Cannel Row 1s 1,325 ton/week.

Dirt-winding Arrangements

Dirt to be stowed in the Moss Seam is wound on two shifts, days and afternoons, and, in particular, it is wound as the requirements of the face become known during the course of the shift. There is no provision in the Moss Seam for the bunkering of dirt except in tubs along the roadway. This acts as a very limited buffer and often interferes with coal production and haulage.

The dirt requirements for the Cannel Row Seam, where stowing is carried out only on the nightshift, is wound on the dayshift alone, to be bunkered at the staple shaft. The only limit to the amount of dirt that can be wound on the dayshift is that imposed by the remaining unfilled capacity of the bunker. The bunker is seldom full and yet is never allowed to fall below the minimum of about 250 loads, more than the amount required to stow a complete face.

Two dirt loads are wound on the bottom deck of the three-deck, six-tub cages.

Underground Transport and Bunkering of Dirt

Dirt to the Moss Seam is transported on the coal haulages and is not stored in a bunker.

To the Cannel Row, dirt is passed over a series of urgers from the pit bottom to a Campbell-Ritchie tippler at the head of the staple shaft bunker (Fig. 3). Here two men tip and clean out the loads before returning the empty tubs to the empty-tub circuit.

At the foot of the staple shaft, a steel-walled delivery hopper allows dirt to flow on to the distributor belt through a sluice type gate and then a secondary swinging bucket type of door. As the 30-in. conveyor moves the dirt away, the flow of dirt on to the belt is regulated by an adjustable restrictive throat built into a small hopper on the belt itself. A continuous supply of dirt to the electrically driven Markham stowing machine is effected by simply leaving the bunker doors open during the whole of the shift and subsequently stopping and starting the conveyor as required.

The Cannel Row 1s return gate belt is in tandem with the distributory belt and is in sequence con-

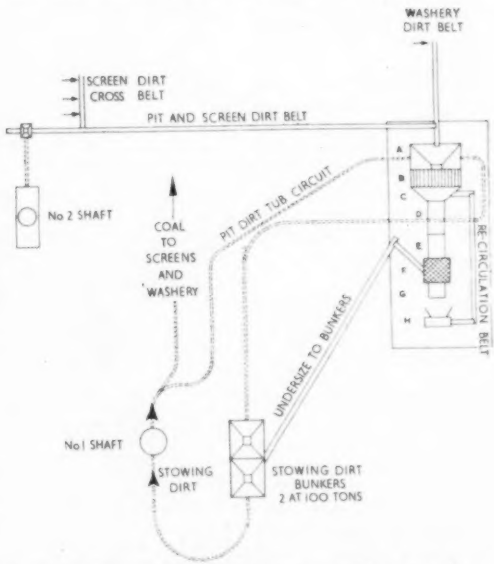


FIG. 4.—DIAGRAMMATIC LAYOUT OF SURFACE DIRT-PREPARATION PLANT. THE REFERENCE LETTERS INDICATE:—A, DIRT TIPPLER AND RECEIVING HOPPER; B, GRID; C, PRINCIPAL CHUTE; D, APRON BELT; E, MAGNET BELT; F, VIBRO-SHAKER; G, PICKING BELT; H, CRUSHER.

trol with it. At the moment, a transfer point attendant is employed, but utilizes the greater part of his time in cleaning up spillage around the conveyors.

Manpower and costs for the underground transport and bunkering of stowing dirt are summarized in Table 3. They are based on average saleable output of 265 ton/day.

TABLE 3.—*Manpower and Cost/ton Saleable of Underground Transport and Bunkering of Stowing Dirt.*

Operation.	Manshifts per turnover.	Rate.	Cost/ton.
		s. d.	d.
Dirt tippers (2)	2	41 0	3.7
Conveyor attendants (2 ..	2	34 9	3.1
Stower drivers (1) ..	1	34 9	1.6
Maintenance (1) ..	1	37 0	1.7
Total	6		10.1d.

Stowing Arrangements

As dirt is delivered from the 30-in. gate belt into the hopper of the machine, water is added from overhead sprays operated by the blower operator. Within easy reach of the operator are all controls associated with the stowing operation. On a small panel are mounted a mains pressure gauge, an input pressure gauge, a back pressure gauge, an audio-visual stower signal unit, a stop/start switch for the stower motor, a stop/start switch for the feeding conveyor, and a wheel valve spray control.

Working pressure is controlled by a Markham automatic economy valve to give the most economical utilization of compressed air. An indication of the effect of this valve is shown later.

The flanged pipes forming the gate range, deliver from the stowing machine to a telescopic pipe before projection of the stowing material round a 90 deg. right-hand bend into the face range. The telescopic pipe allows two webs to be stowed before it is necessary to put another 3-yd. pipe into the gate range and it also gives a minor amount of freedom in the siting of the elbow bend. The 6-in. dia. face range consists of 31 inside hardened 10-ft. pipes coupled by Westmontan quick-release safety couplings.

A signalling system from a push button at the face end of the pipe range to the stower driver is installed, with sufficient cable coiled in the stowing gate to accommodate up to 100 yd. of face advance. After each 100 yd. of advance, the stowing machine and belt is moved in a 100 yd. and the gate range is shortened by a corresponding amount.

Face Stowing Operation

The maintenance man and stower driver start work an hour earlier than the normal shift to extend the level pipe range and move in the elbow. The face stowing team of four men then come on to the face and finish off the move in. They then split into two teams of two to throw over the 31 face pipes and couple the face range up in the new track. While two men finish off this work, the others build an end pack wall on the main-gate pack site. The first "blow" is then prepared in the conventional manner. Twenty-ft. sections, comprising two pipe lengths, are prepared and stowed consecutively back down the face. Overall face costs and manpower are shown in Table 4.

TABLE 4.—*Manpower and Cost/ton Saleable (Actual) of Face Personnel During July, 1960.*

Operation.	Man-power.	Week ended			
		July. 9	July 16.	July 23.	July 30.
		s. d.	s. d.	s. d.	s. d.
Filling	17	5 9.5	5 9.2	5 3.1	5 6.4
Stowing	4	1 6.4	1 6.4	1 5.2	1 4.4
Moving conveyors ..	4	0 9.7	0 10.4	0 10.6	0 10.0
Boring	2	0 7.9	0 6.9	0 6.4	0 7.2
Cutting	2	0 8.5	0 7.7	0 7.3	0 6.6
Ripping	10	3 1.5	3 3.8	3 2.4	3 0.3
Other face work ..	3	0 9.4	0 10.4	0 10.4	0 5.3
Shotfiring	4	0 11.9	0 9.7	1 0.2	0 9.4
Total	46	14 4.8	14 4.7	13 9.6	13 1.6
Theoretical and actual m.s.t.	173	184	180	172	166
Face o.m.s.		109.2	110.7	116.3	120.3

Related only to manpower, the analysis of stowing costs can be shown as in Table 5, allowing an average cost for stowing at the face to be 1s. 6.2d./ton.

TABLE 5.—*Stowing Costs/ton Saleable of Manpower.*

Operation.	Cost/ton saleable.
	s. d.
Surface	0 2.0
Underground transport	0 10.1
Face	1 6.2
Total	2 6.3

These cost figures are as accurate and as representative as it is possible to report them. They reflect credit upon the several teams involved in the planning, development, management, and working of the district and the seam.

Stowing Performance

To substantiate the cost figures already tabulated it is possible to show some relative evidence in the way of performance figures. In March, 1960, a team of investigators from the Central Engineering Establishment of the NCB at Bretby visited the colliery to carry out a series of independent tests on the stowing installation.

The object of these tests was to find out the degree of economy that could be obtained in the consumption of compressed air by the use of the Markham economy valve. The data since received from Bretby are shown in Tables 6 and 7.

The face length stowed was 113 yd. with a track width of 4 ft. 6 in. and a height of 4 ft.

The stowing team at the face has developed into an exceptionally closely co-ordinated unit and consequently make substantial contract earnings. Each man knows his place in the team and the task that he must perform at any stage in the stowing

TABLE 6.—*Test Data on Stowing Performance Observed and Recorded by the Central Engineering Establishment of the NCB, Bretby.*

Test.	Total time, min.	Stowing time, min.	Observed stowed distance, ft.	Total weight stowed, tons.	Average stowing rate, ton/hr.	Overall stowing rate, ton/hr.	Average rate of flow of air (stowing), cu. ft./min.	Condition.
1	213	73	150	145	119	40.8	4,030	Operating with economy valve.
1A			280	232				
2	266	92	200	174	114	39.3	3,417	
2A			290	270				
3	242	86	200	173	120	42.9	3,674	
4	244	86	210	166	116	40.8	4,333	Hand control of air.
4A			290	231				
5	214	77	160	167	130	46.8	4,912	
6	209	71	210	154	130	44.2	4,892	
7	210	75	220	169	135	48.3	4,853	

TABLE 7.—*Average Daily Performance.*

Cu. yd. stowed per machine shift.	Tons of dirt stowed per machine shift.	Cu. yd. stowed per manshift.	Tons of dirt stowed per manshift.
226	288	56.5	72

operations. Verbal communication between members of the team is thus limited to an absolute minimum.

The performance of the team can be illustrated by taking a time analysis from a random normal shift. Since the face is close to the pit bottom and the team take the first wind into the pit and the last wind out, the time available to the stowing operation is, in fact, slightly more than the standard 7½ hr.

Time available for machine operation was between 380 and 450 min. and the time to prepare 20 ft. for stowing (approximately 4 ft. high, 4 ft. 6 in. wide, using 6-ft. by 2-ft. 6-in. containing sheets) was 14.4 min. Time to stow 20 ft. of face was 8.4 min., giving a rate of stowing of 33.3 cu. yd./hr. Signalling delays amounted to 1.2 min. and the total time to stow 20 ft. of face was 24 min.

Seldom do the team reach the surface after the last of the day-shift workmen have been taken below ground. To complete the full stowing operation in a shift, the team must set a target for the laying of the face pipe range before stowing can start. The time set is in the region of 1½ hr. after the start of their shift and this gives them 1½ hr. in which to lay and couple up 33 pipes. This is an adequate margin since the individual pipes already lie in the new race.

As pipes are taken off the range to prepare the next "blow" they are threaded between the back props of the conveyor race and allowed to rest between this back row of props and the conveyor.

Perhaps an uncommon feature of the installation is that stowing is taken up to the face conveyor without leaving a travelling road.

Compressed Air and Electricity Costs

Returning to the cost aspect of the stowing installation, it is obviously necessary to consider the consumption and cost of compressed air and electricity. By a survey of all operations associated with the generation of compressed air, it has been found that the cost per unit of compressed air at Holditch Colliery is in the region of 4.5d./1,000 cu. ft. The charge per unit of electricity is 1.2d./unit, including maximum demand charge. Table 8

TABLE 8.—*Compressed Air and Power Costs of the Cannel Row Stowing Unit.*

Source.	Power cost.	Total cost of stowing.	Cost per ton saleable.
		s. d.	s. d.
C/A	4.5d. per 1,000 cu. ft.	214 1	9.7
Electricity ..	1.2d. per unit	172 0	7.8
Total ..	—	386 1	1 5.5

gives the compressed air and electricity consumption costs of the stowing unit. The consumption of compressed air per day is 571,000 cu. ft. Overall costs are given in Table 9.

TABLE 9.—*Overall Stowing Costs.*

Source.	Cost per ton saleable.	Power proportions.
	s. d.	s. d.
Surface	2.0	6.4
Underground transport	10.9	1.4
Face	1 6.2	
Compressed air and electricity ..	1 5.5	9.7
Total	4 0.6	1 5.5

For the purpose of comparison, results are shown in Table 10 for the Cannel Row face, a comparable face pneumatically stowed by a belt fed Markham stower, and a Spencroft face at Holditch which is strip packed and of similar face height and nature to the Cannel Row face.

TABLE 10.—*Comparison of Stowing Costs per Ton with a Similar Pneumatically Stowed Face and a Strip-packed Face.*

Operation.	Cannel Row unit conv. fed Markham stower.	Comparable unit conv. fed Markham stower.	Spencroft unit (strip packed).
	s. d.	s. d.	s. d.
Surface dirt preparation ..	2.0	4.4	—
Underground transport ..	10.9	1 0.9	—
Face	1 6.2	2 3.6	—
Compressed air	9.7	9.0	—
Electricity	7.8	2.4	—
Packing and waste drawing	—	—	2 3.5
Boring wastes	—	—	6.5
Shotfiring	—	—	2.8
Total	4 0.6	4 8.3	3 0.8

The Cannel Row face costs exclude an assessment for repairs and renewals. In the comparable unit, bunkering was not used, the dirt being piped to the pit bottom via a dipping drift. The costs for this unit exclude 3.7d./ton for the dirt preparation process, and 3.1d./ton for an assessment for repairs and renewals. The costs for the Spencroft strip-packed face, which has a packing section of 3 ft. 8 in. high by 4 ft. 6 in. wide, exclude the cost of Hydrox Shells. Also considerable back ripping costs on face roaways are excluded.

Conclusions and Remarks

Stowing performances on Cannel Row 1s face have been excellent since stowing was introduced in January, 1960; costs have been low and stowing rates high.

The good stowing performances achieved on the face are very largely due to the ready availability of the stowing material. Considerable advantage is to be gained from stowing installations fed by conveyor from underground bunkers.

The stowing installation has provided excellent roadway and face conditions, but comparison with strip packing is difficult since neither the roadways nor the face has been subjected to excessive roof pressure. Convergence on the face is negligible under the prevailing roof conditions and surface subsidence has not yet made itself apparent. Convergence has not been measured either at the face or the surface.

Face ventilation is excellent and no difficulty is experienced with either gas emission or atmospheric conditions, although air velocities at the face are sometimes too high.

The accident rate on the face is low at 0.2 per 1,000 tons saleable. Although this cannot be directly attributed to pneumatic stowing of the waste, waste side accident risks are greatly reduced.

Loss of face supports is kept to an absolute minimum. No roadway supports have yet been drawn from the district, but it is expected that easy withdrawal of a very large number of undistorted arches will be possible when the district is salvaged.

Dirt disposal on the surface is considerably eased by the further utilization of pit refuse in stowing wastes underground.

With adequate forethought it is possible to plan and introduce pneumatic stowing at a cost commensurate with that of conventional systems of packing wastes. The paper has, it is hoped, demonstrated the truth of this statement. The authors wish to thank the West Midlands Divisional Coal Board for permission to publish this paper. Any opinions expressed are those of the authors and not necessarily those of the board.

GEC High-pressure Brake Engines for Africa

MECHANICAL parts of a 16-ft. dia. double-drum winding engine which were ordered from the General Electric Company, Limited, by the Doornfontein Gold Mining Company, Limited, in South Africa, are approaching completion. This winder is to be fitted with two of the newly developed GEC high-pressure brake engines, which have been tested at the company's Erith Works prior to shipment.

A duplicate pair of brake engines is under construction at Erith for a similar winder for the West Driefontein Gold Mining Company, Limited, another company of the same group, and these will also be shipped later this year.

These engines are the largest so far constructed for operation with a new high-pressure system which was designed at Erith and first installed in 1960 at two British collieries. The system uses high-pressure oil in the range 3,000 to 6,000 lb./sq. in. and offers the dual advantage of accuracy of control under all operating conditions combined with speed of brake application in cases of emergency.

The medium of high-pressure oil is used for both the application and release and braking torque, but nests of disc springs are incorporated to apply the brakes in the remote event of a complete pressure failure.

Calculating Rock-bolt Requirements

NEW procedures for calculating rock-bolt spacing to promote safe maintenance of mine roofs have been developed by the Bureau of Mines, US Department of the Interior. The development resulted from a co-operative study of roof-support problems in a Michigan copper mine. The method is said to be applicable for most bolted roofs and for most mines.

First step of the new method is to overbolt—install many more bolts than are needed—as rooms of varying span are mined. After each such room is mined out, the bolts are selectively removed, individually or in groups, by blasting the nuts off the bolts. Sag, strain, and bolt load are measured from outside the room, between removals. Computations based on these measurements show the spacing of rock bolts in relation to optimum roof span for any reasonable factory of safety.

Details of the method and mathematical and mechanical aspects of its application are given in Bureau of Mines Report of Investigations 5746, "Determining the In-place Support of Mine Roof with Rock Bolts, White Pine Copper Mine, Michigan," which can be obtained from the Publications-Distribution Section, Bureau of Mines, 4800, Forbes Avenue, Pittsburgh 13, Pa.

TWO NEW GAS METERS, designed specifically for industrial installations using gas at pressures up to 100 lb./sq. in., now being made in this country by Parkinson Cowan Gas Meters, are the first of their type to be made available in the UK.

New Literature

PUBLICATIONS received include the house magazines, catalogues, booklets, etc., referred to below. Readers wishing to obtain a copy of any of the items should write to the address given, at the same time mentioning this journal.

EDGAR ALLEN & COMPANY, LIMITED, Imperial Steel Works, Sheffield 9—The manufacture and uses of austenitic manganese steels are discussed by C. Elliott, the company's electric steel melting superintendent, in the June issue of the Edgar Allen News, which contains a number of other interesting articles, several of which are continued from the previous number.

BRITISH PUMP MANUFACTURERS ASSOCIATION, 94/98, Petty France, London, S.W.1—The 1961 edition of the association's Buyers' Guide gives an alphabetical list of members, their trade names and marks, and an alphabetical list of pumps—types and uses—manufactured by the members. Other features contribute to make this a very useful reference book, copies of which are available to all inquirers.

BROOK MOTORS, LIMITED, Empress Works, Huddersfield—List 929 is an informative 16-page booklet for the electric motor user. It gives valuable help in obtaining the correct type of motor for specific purposes. Constructional variations, covering the needs of normal, dust laden, or even explosive atmospheres are covered and a section on electrical modifications gives useful data on reversing, multi-speed, and intermittent rating characteristics.

CRAVEN BROS. (MANCHESTER), LIMITED, Vauxhall Works, Reddish, Stockport—The general expansion of the steel industry throughout the world has resulted in the manufacture of roll lathes and roll grinding machines retaining a leading position in the company's manufacturing programme. The May-June issue of the Craven Machine Tool Gazette includes a description of one of the smaller roll grinding machines, which embodies all-vee-belt roll rotation.

G. A. WILLIS (MIDDLESBROUGH), LIMITED, Aycliffe Trading Estate (Co. Durham)—A recent discovery by the company of a plastic coating which bonds to steel has aroused considerable interest, and a special plant for its application is in the course of construction at Aycliffe by Dorman Long (Steel), Limited, which intends to apply it to steel sheet. Later, it is expected that this treatment will be extended to steel girders and ship plates. "The 'Vynasol' Story" is the subject of an eight-page brochure.

INTERNATIONAL NICKEL COMPANY (MOND), LIMITED, Thames House, Millbank, London, S.W.1—"Nickel in s.s. Canberra," a 24-page brochure, illustrates the "thousand and one" applications of nickel-containing materials in one specific case history. The Canberra is a revolutionary vessel incorporating the latest thinking in architecture and marine engineering. The publication describes some of the interesting new features of the ship, and shows in this, the most modern vessel of its day, how an established and versatile metal—nickel—plays its vital part.

HILGER & WATTS, LIMITED, 98, St. Pancras Way, Camden Road, London, N.W.1—"Electron spin resonance is not a subject that every schoolboy knows," states the opening sentence of the editorial in the June issue of the Hilger Journal. Readers are assured, however, that it is a subject that a great many analysts will want and need to know in the coming years. The writer of the editorial then leaves it to H. M. Assenheim to explain just what electron spin resonance is all about and how it can be used in research and industry as a powerful analytical tool.

NORTH-WESTERN DIVISIONAL COAL BOARD, 40, Portland Street, Manchester 1—The June issue of Pit Prop will be the last, as it is to be merged with a new monthly newspaper to be published by the National Coal Board. This new publication, as previously reported in these columns, will be called Coal News and will supersede Coal Magazine. Pit Prop first appeared in March, 1948; many readers will regret its passing, but it is obviously a wise move for it to link up with Coal News. The North-Western Division, so well served by Pit Prop in the past, will have four pages to itself every month in the new publication.

BRITISH TRANSPORT COMMISSION, 222, Marylebone Road, London, N.W.1—Since 1954, when British Waterways was established and the main system of British canals and inland waterways came under its control and managership, a great backlog of maintenance has been overtaken, and big and far-reaching schemes of modernization and development have been under way. A new booklet, "Six Years of Progress," has been produced outlining the progress of much of that work and recording the dramatic improvements in productivity which have been achieved. Facts about the lesser known but nonetheless vital water-supply services are also described.

INSTITUTION OF METALLURGISTS, 4, Grosvenor Gardens, London, S.W.1—In "Metallurgical Research in Great Britain," an article in the May issue of the Metallurgist, Prof. A. G. Quarrell describes the work of the Swinden Laboratories of the United Steel Company, Limited. Other articles include "Sandwich Courses in Metallurgy," by D. Thacker, head of the Department of Science, Sheffield College of Technology, "Metallurgy Aids the Semiconductor Industry," by R. P. Marshall, chief chemical engineer, Semiconductors, Limited, and "From the Back Room," by R. F. Cotton, of the International Nickel Company (Mond), Limited, in which the author describes a simple apparatus for electrolytic etching.

DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH, 5-11, Regent Street, London, S.W.1—Balancing DSIR's research effort to meet the rapidly increasing technological demands of the present day—and of the future—has been the main task of the Council for Scientific and Industrial Research recently. In its report for 1960—"Reports of the Research Council of the Department of Scientific and Industrial Research" (Cmnd. 1365), published by the Stationery Office at 4s. (postage 10d.)—the council emphasizes that the steady expansion over the last two years raises not only difficulties in the broad direction of scientific policy but also considerable administrative problems. DSIR expenditure has increased from £8,900,000 in 1958-59 to £12,200,000 in 1960-61.

BROKEN HILL PROPRIETARY COMPANY, LIMITED, 500, Bourke Street, Melbourne, Australia—Many interesting articles are to be found in the April number of the BHP Technical Bulletin. Among them are:—"An Outline of Operations Research," by E. B. Hands, officer in charge, operations research, Newcastle Steelworks; "The Mercury Vapour Equipment and Gas Flow Distribution in an Open-hearth Regenerator," by W. A. Howarth, research officer, central research

laboratories; "The Scale Model Furnace and Open-hearth Gas Flow Research," by A. S. Schrader, works research officer, Newcastle Steelworks; "A Method for the Spectrographic Analysis of Sinters, Flue Dust, and Iron Ores," by J. H. Savage, acting chief chemist, Port Kembla Steelworks, and "Some Unusual Defects on Flat Products," by J. A. LeBas, senior investigating metallurgist, flat products division, Port Kembla.

BASOL, LIMITED, Basol House, 12, Bolton Street, London, W.1—"Facts About Rust Removal and Rust Prevention," a new brochure, describes the uses of "Basol-Fepar," a rust remover, rust converter, or rust preventer put on the market after several years of research and development, followed by a considerable period of practical use in the UK and oversea. The booklet states: "It is unnecessary to remove heavy loose rust and scale chemically, as this can be done simply by manual means. 'Basol-Fepar' then converts the rusted surface to an iron phosphate film. This film forms an integral part of the metal surface; it is not a deposited zinc or manganese phosphate layer. Iron phosphate films form some of the best surfaces for subsequent finishing, *e.g.*, painting, etc." A second booklet, "Facts About Degreasing," is concerned with Basol 77, a degreasant which "cleans quickly, is harmless to ferrous metals, copper, brass, and their alloys, is safe for operators and requires no special protective clothing, is cheap to use, removes grease, dirt, dust, oil, wax, tar, carbon, and paint with absolute efficiency, and is non-caustic, non-toxic, and non-corrosive, and is non-inflammable."

Indian Steel Plants Nearing Completion

INAUGURATING the annual general meeting of the Institute of Indian Foundrymen, Sardar Swaran Singh, Minister for Steel, Mines, and Fuel, Government of India, said that in recent years India had reached the "break-through stage" in the steel industry. Earlier, in the Lok Sabha, New Delhi, dealing with the progress of the three steel plants in the public sector, the Minister said that construction was nearing completion in all the plants—Rourkela, Bhilai, and Durgapur.

The fourth State steel plant in India, which is expected to be set up at Bokharo during the Third Five-Year Plan may be in collaboration with the Japanese steel industry.

Eight schemes, totalling a capacity of 300,000 tons, have been sanctioned for the production of pig-iron in the private sector through medium-sized plants in India.

Conference on "Hydrogen in Steel"

CONFERENCE on "Hydrogen in Steel," to be held at Harrogate from October 11 to 13, is announced by the Metallurgy Division of the British Iron and Steel Research Association.

Specific aspects of the problem to be discussed include:—Removal of hydrogen from liquid and solid steel; the diffusion and solubility of hydrogen in steel; the effect of hydrogen on the properties of ultra-high tensile steels, and hydrogen in weld metal.

Full details and application forms will be available from August 14, when applications should be made to the Technical Secretary, Metallurgy Division, BISRA, 11, Park Lane, London, W.1.

CORRESPONDENCE

"SHINY OLD IRON"

To the Editor of IRON AND COAL

SIR,—We would like to add a little to the letter by Mr. J. H. Slagg (April 7, 1961) concerning the Roman nails recently discovered at Inchtuthill (Perthshire). (Incidentally the quantity is 12 tons, not 7.)

The nails are now being sorted into sizes and types with the generous co-operation of Colvilles, Limited, and representative samples are being examined from the corrosion and metallurgical standpoints. It is proposed to publish the findings and hold a short meeting to discuss the results, under the auspices of the Iron and Steel Institute.

From examinations carried out to date, it appears that a high proportion of the material used contained considerable quantities of carbon. It is also apparent that each nail is made up of a number of pieces of iron of different composition all welded together. This was to be expected, of course, and confirms the results of a previous investigation in which it was found that globules of metal present in some slags from a Roman ironworking site (Chichester) also contained high percentages of carbon.

Mr. Slagg's point regarding corrosion is quite true, those nails that were near the outside of the hoard having suffered severe rusting. Some of the nails also had bright slag globules adhering and in some cases the forging scale appears to have been modified by the presence of slag. The nature of the scale is one of the points under investigation at present. As mentioned earlier, it is hoped to report these, and other interesting points resulting from the investigations now in progress, more fully at a date not far distant.—Yours faithfully,

N. S. ANGUS
(Production Engineering Research Association).
G. T. BROWN
(G.K.N. Group Research Laboratories).
H. F. CLEERE
(Iron and Steel Institute).

Iron and Steel Institute,
4, Grosvenor Gardens,
London, S.W.1.
June 9, 1961.

Coal Found in Sinai Peninsula

According to an announcement made recently in Cairo by Rian Hegazi, Vice-Minister of Industry for the Egyptian section of the United Arab Republic, coal deposits estimated at about 80,000,000 tons have been found in the Sinai Peninsula with the help of Soviet geologists. The coal is reported to be of good quality, containing only 8 per cent. of ash.

Mining Journal Annual Review

The 1961 edition of the Mining Journal Annual Review is now available from the Mining Journal, 15, Wilson Street, London, E.C.2, price 25s. The value of this publication is perhaps best appreciated by those who keep it to hand year by year and who thus become really familiar with its contents. The volume, containing 376 pages, is in three main sections—a review of metals and minerals, technical progress, and a survey of the world's mining fields. There are also lengthy articles on underground mining, open-cast mining, coal preparation, extraction metallurgy, and other subjects, together with a buyers' guide and other features, combining to make this a valuable reference work.

PROCESS CONTROL FOR TINPLATE

Recording of Coil Quality

USERS of tinplate in the USA have been switching over from buying it in sheared strip form to coil form. As a result of this change in the production of tinplate, producers soon found that manufacturing the product in coil form presented many problems.

When tinplate was shipped in sheared strip form the individual sheets were inspected and sorted into various classifications. These classifications provided the steel mills with the quality control information necessary to establish the amount of prime and secondary grades of tinplate. At the beginning of the manufacture of the tinplate in coil form none of this information was readily available; even the deviations in the predetermined quality of the completed coil became an unknown factor because of the lack of definitive information.

Data Accumulation System

Airborne Instruments Laboratory (AIL), a division of Cutler-Hammer, Deer Park, N.Y., claims that the problems of accumulating all of the necessary process control data as the coils of tinplate are being run at the rate of 1,600 ft./min. have been solved with the development of the AIL data accumulation system. The system accumulates all pertinent data from the electrolytic tinning line as the coils are being run and presents the information in the form of a typewritten record. This system gathers information from a number of sensing devices and visual inspection stations, mounted along the output section of the continuous-process line ahead of the shear and coilers.

The input devices used on the line at one of the steel-mill installations include a pinhole detector of the photoelectric type, a Beta-ray to measure base metal thickness and provide over-gauge and under-gauge signals, and a set of four X-ray gauges to determine tinplate thickness and supply signals indicating top plating light or heavy and bottom plating light or heavy. A footage tachometer provides an accurate measure of strip length; the two visual inspectors' stations provide signals as to footage of visual defects such as colour markings and unmelted coating. Welds are located by an operator, who presses a push-button as the weld passes his station.

The system consists of a main computer unit that accepts as inputs the signals from the sensing units, accumulates this data, equalizes the information to one point on the strip, calculates and combines information into the required form, and stores it until the coil is completed. When the coil length required has been run, the output shear is operated; this action initiates the printout of the information pertaining to the completed coil by two electrically operated typewriters, one on the line for operator's use and the other in the office of the superintendent of the tinplate department. The printed information is in decimal form for direct usage.

On the operator's control panel, a number of large dial switches are used to enter data such as date, turn number, lot number, and coil number. This information is printed out at the start of each coil printout for identification purposes.

The main computer contains three identical computers operating in parallel. Each of the three computers contains an input section, a main arithmetic section, a memory section, and an output buffer section. The computer sections utilize AIL plug-in transistorized logic modules. The memory units are magnetrostrictive delay lines. Thus, the entire unit is composed of solid-state devices with no moving parts and very low power dissipation. No cooling devices, blowers, or air conditioners are required.

Each of the three computers contains 18 information channels, which accumulate the data into 18 registers in the buffer storage unit. Each register has a 20-bit capacity. Binary-coded decimal notation is used throughout the computer sections.

The 18 channels in each computer do not exist as separate physical entities but rather appear in time only, the time being defined by when the information enters the recirculating delay lines. This time-multiplexing permits the full use of the inherent high-speed operation of the delay lines without requiring the entire computer section to be operated at high speed.

One small section of each computer handles the bits entering and leaving the delay lines; these are all high-speed units. The outputs of the delay lines are handled by more economical low-speed units.

The high-speed section of each computer contains one arithmetic unit. The computers are so organized that this one unit operates sequentially on each of the 18 channels of information. It is here that information is combined and computed to provide the required results, that is, pinhole and over-gauge footage, etc.

Because the sensing devices that gather the information on the quality of the tinplate are spread over a considerable length of the line, it is necessary to equalize this information so that the printout occurs as if all the data were gathered at the

output shear location. This ensures that all the data is printed for the coil to which it belongs.

The equalization is accomplished by synchronous operation of the delay lines. Incoming information from the line sensors is stored in the computer input sections and then entered into the recirculating delay lines. The orbit time of the information in the delay lines is then set to be somewhat faster than the speed of operation of the tinning line. The delay time in the input section, together with the orbit time for each piece of information, is selected so as to provide the required equalization for each channel.

Each of the three computers terminates in an output accumulator section in which the coil data are accumulated. When the output shear is operated, the print cycle is initiated, and the accumulator contents are transferred into three output buffer sections.

Following the output buffers is a single voting machine. Upon initiation of a print cycle, this section examines the information and if each of the three buffers contains the same answer, that is the correct answer and it is printed. If one of the answers does not agree with the other two, then the majority is made to rule by the voting section, and the two in agreement are printed out. In addition, the fact that one answer was incorrect is kept track of and, after a preset number of such errors, an indicating light is lit to show that the computer is in error and should be checked. The voting is carried out bit by bit.

As the correct information is passed from the voting section it goes to the print programme section, where the data is organized into the required format and such zeros as are not desired for printing are suppressed.

Finally, the information is passed through a binary-coded decimal-to-decimal converter into the output amplifiers. These output amplifiers then operate the solenoids on the typewriters.

The typewritten sheet contains in a single row, the date, turn number, lot number, and coil number; total feet per coil, total prime feet, pinhole-feet, and footage of each of the other defects. In this form, the record is then directly and immediately useful for quality control evaluation, pricing of the coil, setting of incentive pay, and production control operations.

Advantage to Tinplate Manufacturers

The use of the three parallel computers provides many advantages to tinplate manufacturers. First, with three identical computers, the system will provide the required records with all three computers, with any two out of the three, or with any one computer operating normally. Thus, if one or even two of the computers should be shut down for any reason, coil stock can continue to be made and reliable records obtained. Second, with all three or even two computers operating normally, the accumulation of spurious bits by one computer does not destroy the reliability of the printed record. These stray bits can occasionally be found in a computer. Their source is frequently unknown, and their occurrence is so infrequent and so random that the cure of the cause becomes a very irksome process.

With the three-computer system, any required routine maintenance operations can be carried out during operation of the line without stopping the data accumulation. Finally, and probably of most importance, the three-computer system inspires complete confidence in the records at all levels of steel company managements, and their customers have quickly acquired this same confidence.

There are many applications of data accumulation in the various continuous process industries. The product and the important physical characteristics vary widely, in various processes, but the requirements of quality control, production control, pricing, and other operations are such as to warrant the purchase and installation of some form of data accumulation equipment.

TASMANIAN IRON-ORE DEPOSIT

IT is estimated that about two years of fairly continuous drilling will be needed to determine the prospects of the Savage river iron-ore deposit. The deposit is in difficult country between Corinna and Waratah. The main part is on a razor-back ridge with gorges 1,000 ft. deep. Rainfall in the area is 70 to 80 in. per year. The orebodies extend as a line of magnetite outcrops for about three miles, a correspondent reports.

A dominating topographic feature in the locality is the broad peneplain extending for many miles at heights of 1,100 to 1,300 ft. above sea level. The major drainage channels are cutting rapidly into this mass and are still in a youthful stage of erosion. Near the deposits, the Savage river and Halls Creek have cut down some 800 ft. into the plain and at their confluence are not much more than 400 ft. above sea level.

Because of their mode of origin, it is expected that the boundaries of the iron will be sharp but irregular. The intrusion of the basic rock is in a north-south direction and regional stresses have produced a general steep easterly dip. The iron is thus contained in a north trending zone and consists of a number of lenses with steep dips to the east. The iron outcrops boldly in a number of places, particularly on the north and south banks of the Savage. This river has cut a trench some 700 ft. deep through the main southern concentration of the iron.

The ore possesses some favourable structures from the mining aspect, since it forms the top of two prominent ridges—one to the north and the other to the south of the Savage river. From river level, these ridges reach a maximum height of 800 ft. The southern lens could be worked opencut, without any major difficulties, right down to river level. The main northern lens varies in surface elevation from 600 to 840 ft.

Low-temperature Heat Treatment of Spring Wires

TWO kinds of internal stresses are introduced by the cold-working of metals—textural and body stresses. Textural stresses are microscopic, locked up in the internal structure of the grains, and may vary irregularly from one grain to another.

They are usually detrimental and are the main cause of the low elastic limit of work-hardened metals.

Body stresses, on the other hand, are macroscopic, involve complete grains and groups of grains, and are generally beneficial.

In a paper ("The Effect of Low-temperature Heat Treatment on the Static Mechanical Properties of some British and Continental Spring Wires") read at the Coil Spring Federation's annual conference at Torquay on May 12, R. A. Varo, L.I.M., a member of the Research Organization's staff, said that with suitable low-temperature heat treatment, the textural stresses can be relieved without serious reduction in the beneficial body stresses. The object of this work was to determine the optimum low-temperature heat treatment, giving the maximum recovery in mechanical properties of some spring steel wires.

British, German, and Swedish Wires

Two commonly used sizes of British, German, and Swedish wires were used in the experiments. The British wires were EN.49C and EN.49D, both in 0.104 in. and 0.048 in. dia. and oil-tempered wire, 0.104 in. dia. Three types of German wire were used—music wire, oil-tempered commercial quality, and oil-tempered valve spring quality of 0.104 in. dia. only. The Swedish samples were "standard" and "supreme" quality music wire, and oil-tempered wire, all three in both diameters. Mechanical tests were performed on hand-straightened lengths of wire to determine four important properties: the elastic limit before and after prestressing, the ultimate tensile strength, the maximum shear strength, and the number of twists to failure.

The work was only the first phase in a wider study and there is further work to be done on actual springs.

Nevertheless, a number of general conclusions have been reached:—

(1) The experiments showed that the optimum low-temperature heat treatment for the various mechanical properties of the hard-drawn wires was in the range 175 to 250 deg. C. In all cases this value varied independently for each mechanical property and type of wire.

(2) The change in mechanical properties was small over the LTHT range 175 to 250 deg. C., provided severe strain age hardening, which causes serious loss in ductility, did not occur. Age hardening is to be further investigated using gas analysis methods and by isolating tramp element impurities.

(3) The difference in size and initial strength of the two wire sizes caused no significant change in the range of prior LTHT's where maximum elevation of properties occurred. However, this may not necessarily be true for other wire sizes.

(4) A LTHT at 350 deg. C. for half an hour had little or no effect on the static mechanical properties of the oil-tempered spring steel wires.

(5) The results have shown that during the LTHT of hard-drawn carbon spring steel wires, both the relief of detrimental textural stresses, and strain age hardening can occur. The part played by each in increasing or decreasing the "as-drawn" static mechanical properties of these wires is to be further investigated.

"Heat Bibliography, 1959"

PREPARED by the National Engineering Laboratory, "Heat Bibliography, 1959" contains over 4,000 references to papers, reports, and books on heat transfer and related subjects. It includes references on many types of heat exchanger, basic heat-transfer processes, the physical properties of gases and liquids, instruments for measuring temperature and flow rate, the economics of heat-exchange plant, the effects of corrosion and fouling on the efficiency of heat exchangers, and many other associated topics. The references were obtained from original publications and abstract journals, and all relevant titles noted in NEL during 1959 have been listed. They have been arranged under a simple subject classification which avoids extensive cross-referencing.

The bibliography will be of particular use to manufacturers and users of all types of heat-exchange plant (including boilers, condensers, liquid coolers, refrigerators, and distillation equipment) and to research workers in the field of heat transfer. It may be obtained from HM Stationery Office, 13a, Castle Street, Edinburgh, price 20s. (by post 21s. 9d.). Copies cannot be obtained directly from the National Engineering Laboratory.

Obituary

SIR ROBERT MARTIN

Work for Miners' Accident Relief Society

CHAIRMAN of the Midland District Miners' Fatal Accident Relief Society since 1916, Lt.-Col. Sir Robert Martin died on Tuesday at his Leicestershire home at the age of 86. Apart from his activities with the society, Sir Robert played a prominent part in public life, being a county alderman and chairman of Leicestershire County Council from 1924-1960, and a vice-lieutenant of the county.

Sir Robert was educated at Eton and King's College, Cambridge, where he graduated in engineering. He worked as an engineer for three years on the Great Central Railway and on a tube railway in London before joining the family business, Mountsorrel Granite Company, Limited. He retired from the firm in 1920 to devote all his time to local government and public work.

Sir Robert first joined the Midland District Miners' Fatal Accident Relief Society in 1900, and had the reputation of never missing a meeting. He was also a member of the Church Assembly and chairman of the Directors Ecclesiastic Insurance Office. As chairman of the governors of the Loughborough Colleges, he took an important part in their development, including the College of Technology.

Director of Bairds & Scottish Steel, Limited, Mr. MATTHEW LAURIE GARRETT died last Friday.

Mr. ROBERT BURGESS, foreman of the screening plant at Montgomeryfield Colliery, Dreghorn (Ayrshire), has died at the age of 61.

Mr. JAMES HERBERT BINGHAM, a past chairman of the Council of the Institute of Production Engineers, has died at the age of 69.

Mr. BERNARD LANE, cashier with Heenan & Froude, Limited, manufacturing engineers, of Worcester, until his retirement in September, 1956, has died. He joined the company in 1910.

Mr. LAWRENCE WILSON, founder and chairman of Gordon Tools, Limited, toolmakers and dropforgers, of Sheffield, has died at the age of 70. Before founding the business in 1940, he ran his own firm of Lawrence Wilson & Son. He was also chairman of Mawheads, Limited, carpenters' hand tool manufacturers.

General manager and secretary of the City of Birmingham Gas Department from 1919 until his retirement in 1945, Mr. ARTHUR WILLIAM SMITH died last Friday at the age of 81. He became a member of the Fuel Research Board, Department of Scientific and Industrial Research, in 1941, and served on the board until he retired.

The death occurred last week of Mr. F. H. HOUGHTON, who had been industrial cable sales manager with Crompton Parkinson, Limited, since 1945. Joining the company in 1936 as a cable salesman, he was appointed manager of the Portsmouth branch in 1939. After three years in that position, Mr. Houghton joined the Cable Planning Authority of the Ministry of Supply, where he remained until the end of the war.

BEAMA Director on Dangers of Price Warfare

EXCESSIVE price warfare in the electrical industry could be dangerous to the national economy, warned Mr. Stanley F. Steward, director of the British Electrical and Allied Manufacturers' Association, speaking at the British Electrical Power Convention at Eastbourne on Tuesday. He pointed out that electrical manufacture was one of the industries on which Britain's prosperity depended. It employed a fifth of the scientists and trained engineers in the whole of manufacturing industry, and the £65,000,000 spent yearly on research was ahead of most other industries.

"High capital charges and heavy expenditure on research produce, in electrical manufacture, a high overhead figure in relation to selling price. Consequently it is easy for anyone, without these commitments, temporarily to undercut the prices of standard products," declared Mr. Steward. "Excessive price warfare in the industry has reduced profit margins to a level which places capital investment and this rate of expenditure on research in jeopardy. If the result is to deter investment and hamper progress, it could prove highly dangerous from a national point of view," he added.

Referring to the power plant programme, Mr. Steward said it was more by good weather than good judgment that the country escaped load shedding last winter. He suggested there was need for a 10-year plan for the whole industry regularly reviewed in the light of technical progress.

Babcock & Wilcox Appoints New Directors

ENGINEERS, boiler-house equipment manufacturers, etc., of London, N.W.1, Babcock & Wilcox Limited has elected Sir Noel Hall and Mr. L. W. Cole to the board. Sir Noel, who was recently appointed Principal of Brasenose College, Oxford, is a director of Fisons, Limited. Mr. Cole has been with the company for over 30 years, became secretary in 1952 and, in 1958, was made responsible for financial control within the group. He will continue as secretary until the end of the year.

Lt. Gen. Sir William Stratton has been appointed chairman of Edwin Danks & Company (Oldbury), Limited, and of Penman & Company, Limited, in succession to the late Gen. Sir Kenneth Crawford. Both companies are subsidiaries of Babcock & Wilcox.

Personal

Sir Harold Hartley Joins Institute of Fuel

PROMINENTLY concerned in fuel matters for more than 40 years, Brig. Gen. Sir Harold Hartley, FRS, has been made an honorary member of the Institute of Fuel. He was chairman of the Fuel Research Board, Department of Scientific and Industrial Research, from 1932 to 1947, and served as chairman of the British National Committee and of the International Executive Council of the World Power Conference from 1935 to 1950, becoming president of the Conference from 1950 to 1956.

Among his other appointments Sir Harold was chairman of the Energy Commission, OEEC, for the year 1955-56 and president of the Society of Instrument Technology in 1957. During the last war he was honorary adviser on the development of home-produced fuels to the Ministry of Fuel and Power.

Personnel manager at Vickers-Armstrongs (Shipbuilders), Limited, Walker, since 1948, Capt. J. E. SISSMORE is retiring at the end of this month. He will be succeeded by Mr. WILLIAM STANBOROUGH.

A new tennis pavilion costing £7,500 was opened at the Ebbw Vale (Mon), works of Richard Thomas & Baldwins, Limited, last week, by Mrs. CEDRIC THOMAS, wife of the general manager of the Ebbw Vale section.

Dr. L. REEVE, who is chief metallurgist at the Appleby-Frodingham Steel Company, branch of the United Steel Companies, Limited, has been elected president of the Lincolnshire Iron and Steel Institute for 1961-62.

Mr. S. S. DAWSON, sales director of W. Canning & Company, Limited, electro-plating plant manufacturers, of Birmingham, has retired after 47 years with the company. Presentations were made to him by fellow directors and staff.

Commercial manager at the Staveley Iron & Chemical Company, Limited, Chesterfield, up to his retirement six years ago, Mr. ALBERT BRADBURY celebrated his golden wedding anniversary last week. He had been with the company for 52 years.

Mr. R. J. CARR, in charge of the civil engineering department of the Thyssen Shaft Sinking Company, Limited, is relinquishing that position in order to resume private practice as technical adviser and estimator to the unit engineering industry.

Manager of Lindsay Colliery, Kelty (Fife), Mr. WILLIAM REID retired recently after 51 years' service in the mining industry. At the age of 21 he became manager of Cowdenbeath No. 7 Colliery. Mr. Reid spent a short time in New Zealand mines in the 1920s.

Chairman of the National Coal Board, Mr. ALFRED ROBENS, who received a Life Peerage in the Birthday Honours, said last weekend that he would take the title of Lord Robens to maintain his identity with the public. He will assume his title as soon as it has been gazetted.

Twin 10-year-old sons of Mr. JOHN KING, chairman and managing director of Pollard Bearings, Limited, Knottingley (Yorks), PHILIP and RUPERT KING last Friday laid the foundation stones of a 55,000 sq. ft. factory, which will assist the firm's big output drive of ball and roller bearings required for an expanding market.

Prof. P. W. HOEK, who has been appointed commercial manager of the South African Iron & Steel Corporation, Limited, will take up his new position in August. He will leave the Pretoria firm of accountants with which he has been associated since 1942, but will continue to hold the Chair of Accounting and Auditing at the University of Pretoria until the end of the year.

Deputy Prime Minister of Western Australia, Mr. A. F. WATTS last week visited the works of C. A. Parsons & Company, Limited, turbine and turbo-electric generator manufacturers, etc., of Newcastle-upon-Tyne. He was received by Mr. GORDON BAKER, managing director, and during his tour of the works saw large turbo-generators under construction, and also visited the company's nuclear research centre.

The Senate of Sheffield University has appointed Mr. A. B. HEDLEY to the Central Electricity Authority Research Fellowship from July 1. He is a former employee of the National Coal Board and joined the department of fuel technology and chemical engineering at the university three years ago. He succeeds Dr. Robert H. Essenhigh, who has been appointed an Associate Professor of Combustion Engineering at the Pennsylvania State University.

Manager for the past nine years of Burradon Colliery (Northumberland), Mr. S. GREENWELL has retired. He began his mining career at 14 as a driver at Chester Moor Colliery (Co. Durham), later becoming deputy and master-shifter at Urpeth Colliery. After seven years in Cyprus in iron and copper mining, he returned to Shankhouse Colliery in 1935 as overman and then as undermanager. He also held managerial posts at Nelson and Acomb collieries before going to Burradon in 1949.

After 50 years' service with the firm, Mr. O. C. KERRISON has retired from the chairmanship of the Paterson Engineering Company, Limited, and from the directorate of the associated companies in the group. Joining the late Mr. William Paterson as his personal assistant in 1911, when the company was a small private concern, Mr. Kerrison became a director on conversion to a public company in 1933. He was elected managing director in 1955 and chairman in 1960.

Personnel and Production Appointments at AEI

PERSONNEL services of Associated Electrical Industries (Manchester), Limited, have been re-arranged, Mr. D. J. Crowther continuing as manager, group personnel services. As already announced, Mr. R. F. Marshall has been appointed central education manager of AEI, Limited, and has moved to 33, Grosvenor Place, London, S.W.1. The education department becomes part of the group personnel services. Appointments within the group personnel services are Mr. J. S. Butterworth, labour manager; Mr. H. Walker, staff manager; Mr. B. Dawkins, education manager; and Mr. R. F. Jones, chief information officer.

Other appointments by AEI (Manchester) include Mr. R. Crummack as superintendent (process and rate), and Mr. R. G. Nicholas, superintendent (production engineering services), both in the manufacturing services department. Mr. Crummack attended Sheffield University before joining Metropolitan-Vickers, now AEI, Manchester, Limited, in 1950 as a college apprentice, while Mr. Nicholas studied engineering at Monmouthshire Mining College before joining the company in 1949. Mr. E. Heys, who has been appointed manager, electronic sales department (Manchester), of the electronic apparatus division, joined Metropolitan-Vickers as a school apprentice in 1939.

IRON AND STEEL TRADE

NEW orders for most types of steel continue to ease in spite of the high outputs being demanded of the engineering and contracting industries and a further shortening in delivery dates means that steelmakers are still able to quote for deliveries in the current quarter. Except for occasional spurts the market for tubes has been very quiet and, more recently, the demand for some types of structural steel, notably standard sections and joists, has been following a similar course. In the heavy sector of the industry there is a rather more buoyant market for universal beams and plate.

Pig-iron

Some 86 furnaces are now in blast and from these adequate supplies of pig-iron are being obtained to meet all requirements. The steelworks continue to take substantial quantities of basic pig-iron but they are by no means testing the capacities of the furnaces to the full. Many producers are unable to dispose fully of their makes and they also hold good stocks.

Fairly large tonnages of low phosphorus iron are being taken up by the engineering and speciality foundries and, but to a lesser degree, the same applies to hematite and some refined irons. The high phosphorus pig-irons are plentiful and few of the makers are fully committed.

Ferro-alloys

The price of ferro-tungsten has been increased by 4d. per lb., the first alteration in price for almost three months. Today's price is therefore 10s. 3d. per lb. W contained. Tungsten metal powder is now 13s. 3d. per lb. There has been a slight increase in the demand for ferro-tungsten, doubtless in anticipation of the price change.

There continues to be a good demand for ferro-silicon, and both the low and high carbon grades of ferro-chrome are receiving moderate support. Calcium silicide is fairly active, and there is a steady request for ferro-manganese and silico-manganese.

Semi-finished Steel

There is little change in the general pattern of business and most re-rollers could undertake much more work than is at present available. There is only a moderate demand for small bars and light sections and the call for strip and bright drawn bars is below the average. Apart from reinforcing rods, most products of the re-rollers can be obtained at relatively short notice.

Mild steel semis are easy to come by and the re-rollers also have good stocks. Arisings at the steelworks of suitable re-rolling defectives and crops are readily accepted.

Finished Steel

Makers who specialize in colliery requirements such as light rails, pitprops, arches, etc., are finding no improvement in demand and the majority are seeking further indents to reduce the available capacity in their current and forward programmes. Much the same applies to the makers of cold reduced sheets and strip, flat and corrugated galvanized sheets, and good commercial quality bright drawn bars.

Makers of all descriptions of plate are finding that as output from new plant increases they are overcoming their existing commitments and are able to offer some reasonable forward delivery dates for new business.

SCOW's Reduced Earnings for Half-year

LOWER earnings in the first six months of the year ending September 30, 1961, are reported by the Steel Company of Wales, Limited, which is maintaining its interim dividend at 1s. per £1 share on the £40,000,000 ordinary capital. Sales and other income of £68,650,000 in the half year to April 1, 1961, compared with £70,901,000 in the first six months of the previous financial year. The trading surplus, before depreciation, is £2,310,000 lower at £12,300,000. After all charges and provisions, including £1,500,000 (£1,350,000) to fixed assets replacement reserves, the half-year's net balance of £2,133,000 compares with £3,010,000 in the corresponding period of last year.

The directors state that the reduced earnings are due to the recession in demand for sheet and tinplate during the half-year, and to the substantial increases in fuel and wages costs without compensating increases in selling prices.

For 1959-60, a final dividend of 1s. 6d. was paid, making 2s. 6d. per share for the year.

Ore Chartering

AS far as the near trades are concerned, the number of fixtures reported is still meagre but nevertheless rates have moved against charterers, much depending on actual loading position. Almeria/Rotterdam reports 3,000 tons of burnt ore at 23s. f.o.b. steamer discharging for June shipment, and a cargo of 5,500 tons of residues from Savona to Barrow for Middle June at 25s. 6d. Very little ore is presently on the open market from North Africa to UK or Continent, but there are, on the other hand, inquiries from West Africa and also some interest is noted from India to the Continent.

Huelva Pyrites to Ghent paid 24s. for 4,400 tons June 20/30, and Vassiliko Bay/Rotterdam 27s. for 4,600 tons June 10/24, and some further inquiry is noted from Vassiliko Bay and also Morphou Bay to this side. West African bauxite from Takoradi to East Coast UK paid 55s. for 5,500 tons prompt and further business is available for July. Phosphate is quoting from Casablanca to East Coast UK and a 14,000 tonner has been taken to China at 70s. f.i.o., for June/July shipment.

TEXTILE ENGINEERS, ironfounders, etc., Wilson & Longbottom, Limited, Barnsley (Yorks), has started an extensive development scheme.

Coalfield News

Scots Miners are Guests at Eton

SIX Scottish miners from Barony Colliery (Ayrshire) were guests at Eton last weekend, on a reciprocal visit after seven Eton boys had stayed with them last April. During their stay, the Queen, who is in official residence at Windsor Castle, gave special permission for them to see the State Apartments. She sent a message to the miners hoping they would have a pleasant visit.

An address at Eton this year by Mr. Emrys Hughes, MP for South Ayrshire, on "Coal mining as a career" began the visits. The visiting miners attended tutorials, listened to discussions, made a trip up the Thames to Bray and then returned to Eton where they took part in a debate of the Eton Debating Society. They spent an hour at Windsor Castle with Mr. Hughes and the Eton boys.

OVER 400 MINERS at Kingshill No. 1 Colliery, Shotts (Lanarkshire), who were on strike for four days last week, returned to work on Monday.

AFTER 45 YEARS in the mining industry, Mr. William Rendall has retired as electrician at Kinneil Colliery, Bo'ness (West Lothian). He was chief electrician at Redding Colliery from 1947 until its closure.

OVERALL PRODUCTIVITY in the Durham Division of the NCB in the 22nd week of the year averaged 23.39 cwt. per manshift, compared with 22.11 cwt. in the same week last year. At the face, productivity was 66.87 (64.45) cwt.

MARKHAM MAIN COLLIERY worker, Mr. Ernest Beresford (49), fell 2,000 ft. to his death on Thursday of last week. He was supervising the descent of the cage carrying men going on the day shift when he fell down the main shaft.

THE OLD Senghenydd colliery, scene of one of the worst pit disasters in Britain, may become a recreation ground. Discussions as to the future of the site have been going on between the Caerphilly UDC and representatives of the National Coal Board.

THE ART OF swordmaking and the part coal plays in it; goldmining in Ghana and its similarity to coalmining in the UK; and the background of Howard Winstone, Britain's new featherweight champion, are featured in the July issue of "Mining Review" the NCB's newsreel.

GUESTS at the South Wales miners' annual gala in Cardiff on Saturday were three Russian miners who are spending two weeks in South Wales at the invitation of the Area executive of the NUM. A party of 10 South Wales miners have been invited to visit the Soviet Union in return.

NIGHT-SHIFT MINERS at Adwick-le-Street, Doncaster, have complained to the urban council about the musical chimes of ice-cream vans and the noise of the generating equipment they use. The miners, of whom there are about 1,000 at the two pits in the area, say the noise disturbs their sleep in the day and that of children in the late evening.

FURTHER REPRESENTATIONS to the Minister of Transport are to be made by Carmarthenshire Roads and Bridges Committee for a new road between Pentremawr Colliery, Pontyberem, and the new coal preparation plant at Cynheidre, near Pontyates. It is expected that by 1965 9,000 tons of coal a week would be transported by road in the Gwendraeth Valley from open-cast workings and deep mines.

Miners Discuss Coal Imports with Minister

OPPOSITION to the application by Steel Company of Wales, Limited, for a licence to import American coking coal was registered by leaders of the National Union of Mineworkers when they met the Minister of Power, Mr. Richard Wood, for several hours on Tuesday. They also expressed fears about the Gas Council's proposal to import liquid methane, which is also regarded as a threat to the British coal industry. The Minister, it is understood, replied that both matters were still being considered by the Government, and the union's views would be taken into account.

Mr. S. Ford, president of the NUM, said after the meeting that the Minister had given the deputation "no indication at all" about when the Government was likely to decide its attitude to the SCOW application, or what the decision would be. Asked about threats by the Scottish and South Wales miners to call strikes if the company were allowed to import American coal, Mr. Ford said that these decisions were not union policy, and the matter was not raised before the Minister.

The NUM leaders also reiterated their concern about the competition from fuel oil, and about the decline in the industry's manpower.

The Minister was accompanied at the talks by Mr. Niall MacPherson, Parliamentary Secretary to the Board of Trade, which controls the issue of licences for coal imports.

Scots NACM Golf Competition

IN a golf competition organized by the Scottish branch of the National Association of Colliery Managers at Gleneagles on Saturday, the Mavor Cup, for the best individual score by a member, was won by Mr. George Duncan, manager of Rothes Colliery, while the Plummer Cup, for the runner-up, went to Mr. Sam Ovens, deputy Area production manager (operations), Alloa Area. The Becorit Golf Club for the best individual score by a visitor was won by Mr. Tom Dalrymple, of the civil engineering staff, Alloa Area.

The ladies' prize was won by Mrs. Cowan, wife of Mr. J. R. Cowan, Area production manager, Central West Area. The Anderson Boyes bowling trophy was won by Mr. Thomas Vandepeear, manager of Dalkeith Colliery, Lothians Area.

DOWAGER IS STOPPED FROM WORKING PRIVATE MINE

AFTER several months of experimenting with an invention for the direct extraction of gas from coal, the dowager Lady Wharncliffe has been stopped from working her own coal mine on the Wharncliffe family estate at Wortley, near Sheffield. She has been tunnelling on an open-cast coal site, helped by an ex-miner, Mr. George Hector, of Sheffield.

The contractors in charge of work on the site have decided that the experimental diggings are not safe and have closed the miniature mine—a 12-ft.-long tunnel topped by 400 ft. of rock and earth. Work has stopped, but negotiations have already started with the contractors. A trained engineer, the Dowager Lady Wharncliff had hoped to complete her experiments by August.

THE COAL TRADE

HOUSE coal business is following its normal pattern for this time of the year, orders being few and far between, and mainly for small quantities. So far, domestic consumers have shown little inclination to take in stocks, even with the inducement of summer prices. Industrial trade moves at a steady pace and all requirements are being met satisfactorily. The increase of 35s. a ton in the price of house coal supplies for Eire has caused some consternation in coastwise circles, as it is feared that substantial business will be lost there to America and Poland, which already supply the Republic with coals at prices below those from British mines.

DURHAM AND NORTHUMBERLAND

Common Market issues have aroused new interest in the possibilities of the export market and these are having the attention of the NCB. The North-East coast is securing its share of the trade that is going, but, so far this year, shipments oversea are at about the same level as a year ago although destinations have broadened over a wider sphere of Western Europe. Coke exports, however, have been on a lower scale than a year ago.

Under existing conditions, competition is keen in European markets and pressure on prices was such that it brought some disparity in quotations from the coal exporting centres with, more especially, troublesome variations, so far as this region was concerned, between local tenders and some of those submitted from South Wales. Under Common Market conditions, British prices would no doubt be attractive relative to quality but there might remain the question of supplies. National output this year may not reach the 200,000,000 tons mark and demand for most classes has steadied so that production is fairly readily absorbed inland with not much margin to spare for increased exports. In this area, stocks of inferior steams are steadily diminishing.

SOUTH WALES

Swansea—Supplies of Group 4 house coals continue to be adequate, but most merchants are not in the same happy position with regard to Group 3 cobbles and nuts for which most consumers ask when placing stocking orders.

Anthracite stove and stovesse nuts are still in constant request but dry steam boiler nuts are easier. Merchants in the area are now finding that their order lists for Phurnacite have increased considerably over the past week or so owing to the unexpected delay in despatches from the works.

Industrial demand has increased, due no doubt to consumers stocking in order to cover their needs over the approaching colliery holidays. The coke market shows no change, the only real demand being for hard coke for industrial uses. Supplies of all qualities are available for prompt despatch.

Training Young Miners

COMMENTING on a report that the reduction to single-shift working at the Coal Board's mining training centre at Longton (Staffs) pointed to a decline in recruitment, a NCB spokesman said that the change had been made to boost efficiency and obtain a higher standard among juveniles.

The result was that now, when young men had had two years' face training at the colliery, they went out as highly efficient workers.

More Coal in Stock

INCREASED stocking, both at the pithead and by consumers, dealt with much of the excess of production over consumption in the week ended June 3. Consumption rose sharply from 3,186,000 tons to 3,582,000 tons, but production was only 25,000 tons short of the 4,000,000-ton mark. A little more went into undistributed stocks which are still under 23,200,000 tons, compared with 33,955,000 tons a year ago, but consumers took 270,000 tons more to bring the total of distributed stocks to 1,000,000 more tons than a year ago.

Production is fairly static at just over 3,900,000 tons, but this is nearly 200,000 tons better than the average for the first 23 weeks of the year. Output per manshift at the face again climbed to almost 84 cwt., with a figure of over 29 cwt. overall.

There were 571,860 wage-earners on colliery books on June 3, against 603,940 on June 4, 1960, the numbers engaged at the coal face being 214,380 and 230,650 respectively. Total absenteeism (all workers) in the week ended June 3 was 13.93 per cent., compared with 15.61 per cent. in the week ended June 4, 1960. Output at the face was 4.189 tons and overall 1.456 tons in the week ended June 3, compared with 3.982 and 1.406 tons in the week ended June 4, 1960.

The following table gives (in tons) the provisional figures of output of saleable mined coal by division in the week ended June 10, and the tonnage lost through disputes:—

Division.	Week ended June 10, 1961.		Week ended June 4, 1960.*
	Total output.	Tonnage lost.	Total output.
Scottish	357,000	8,000	357,000
Northern (N&C) ..	246,000	3,000	243,000
Durham	457,000	—	461,000
North-Eastern ..	856,000	9,000	803,000
North-Western ..	245,000	1,000	269,000
East Midlands ..	893,000	26,000	870,000
West Midlands ..	278,000	—	278,000
South-Western ..	367,000	9,000	387,000
South-Eastern ..	28,000	—	31,000
Great Britain—			
Deep-mined coal ..	3,727,000	56,000	3,699,000
Other deep-mined (including licensed mines) ..	40,000	—	45,000
Open-cast coal ..	173,000	—	163,000
TOTAL	3,940,000	56,000	3,907,000

* Nearest comparable week.

ELEVEN YORKSHIRE colliery choirs are to make a long-playing record of 16 carols for a national recording company.

Increasing World Use of Zinc for Galvanizing

OVER 400 delegates from 20 countries last week attended the 6th International Galvanizing Conference at Interlaken, Switzerland, where it was revealed that over 1,200,000 metric tons of zinc, 40 per cent. of the total world consumption, were used for galvanizing and about 6 per cent. of the world's steel production is estimated to be hot galvanized to prevent it rusting.

During 1960 European industry for the first time consumed as much zinc for galvanizing as the US—about 320,000 tons. In the US the galvanizing of sheet and strip took over half and nearly three times as much as general galvanizing. In Europe only Belgium and France used more zinc for sheet than for general galvanizing which is the largest use in most European countries.

A major development in Europe is the increase in the galvanizing of structural steel, much of it by new and specially-built plants, and from the US comes news of the widespread adoption of galvanized strip by the motor industries for body construction especially for underbody panels.

Everywhere the use of galvanized strip is expanding and a further substantial rise in the consumption of zinc for galvanizing is forecast for this year when new strip galvanizing lines under construction in Europe and other countries begin production.

The conference was organized for the European Galvanizers Association by the Zinc Development Association, London, W.1, in co-operation with the Swiss Galvanizers Association.

Scottish Shipbuilders Advised to Bring Rates Test Case

PROTESTING at what they regard as a crippling new rates burden, Clyde shipbuilders have been advised by Lord Craigton, Minister of State, Scottish Office, to put forward a test case on the new shipyard valuations as soon as possible. The Minister met a deputation in Edinburgh. He also told the deputation, stated the Scottish Office, that Ministers intend to review the effects of revaluation on Scottish industry as a whole, as soon as full information, including the outcome of appeals, was available.

A statement from the Shipbuilders' Association warned that "if firms have to allow for this huge rates burden it must mean lost orders, empty berths, and fewer jobs for the Clyde." Shipyard valuation had gone up by 350 per cent. and when derating was abolished in 1963, it would be up by 700 per cent., the association feared.

Leyland Works Holidays Switched to June

ABOUT 12,000 employees at the Leyland, Farington, and Chorley factories of Leyland Motors, Limited, Leyland (Lancs), will start next year to take their holidays during the last two weeks in June, instead of the last two in July, following a ballot among workers. It is felt that a more relaxed and healthier holiday will result if the crowded period in July is avoided.

Educational authorities have stated that any difficulties relating to school work and examinations could be overcome.

In Parliament

SUMMER COAL PRICES

ASKED by MR. RONALD RUSSELL (Con.) how the cheap summer prices of coal and coke compared with last winter's prices, and what price advantages householders who bought coal and coke during the summer could expect to obtain, MR. JOHN C. GEORGE, Parliamentary Secretary to the Ministry of Power, said in a written reply that except for certain Welsh boiler fuels, the National Coal Board's house coal prices were £1 per ton lower now than they were last winter. Buying now compared with buying next winter was likely to save £1 a ton.

Varying changes had been made in gas coke prices and it was difficult to give a comparison with last winter, but from the summer price announcements he would expect the price advantage from buying coke now as against next winter to vary between 15s. and 21s. 8d. per ton. Mr. George strongly urged everyone who could to lay in stocks during the summer. Consumers who did so would not only save money but insure themselves against possible winter delays, he said.

SAHARAN GAS IMPORTS

IN a question on the proposed import of Saharan gas, as agreed in Paris by the Gas Council and the French producer companies, MR. A. ROBERTS (Lab.), asked what estimated effect such imports would have on coal consumption in the UK.

MR. RICHARD WOOD, Minister of Power, in a written answer, said he could not give such an estimate of overall effect. Imported methane would displace some coal gas, supplant some oil for gas making and, as an enriching gas, enhance the value of lean gases produced from coal. An estimate based on the theoretical coal equivalent of a given amount of methane could therefore be misleading.

Changes in Exports Licensing Control

THE Board of Trade announces that certain changes in export licensing came into force on Tuesday. Export control is removed from molybdenum disulphate, certain roller bearings, certain chemical plant and equipment, certain external surface broaching tools, specified deep hole drills and drilling machines, specified spin-forming machines, certain oil well, drilling apparatus, specified aircraft fuels, and high octane blending agents. Control is imposed on the export to all countries of specified cryogenic equipment; and to countries other than Commonwealth, Eire, and the US, on the export of specified ferritic materials, photographic systems for space vehicles, thermoelectric materials, and certain synthetic lubricants.

The descriptions of goods to which export control applies have been amended in respect of amplifiers, electromagnetic waveguides and components, measuring and counting apparatus, radio spectrum analysers, telegraph apparatus, molybdenum, niobium (columbium), and centrifugal counter-current solvent extractors.

NEW LONDON address of Minerals Separation, Limited, is 30, Gresham Street, E.C.2 (telephone: MONarch 6321).

COMPANY NEWS

TANGYES, LIMITED, manufacturers of diesel engines, pumps, hydraulic machinery, etc., of Birmingham—Group net profit for 1960 is £37,760 (£28,019 loss), after tax of £272 (£743).

HALE & HALE (TIPTON), LIMITED, malleable iron-founders, of Dudley Port, Tipton—The directors have declared an interim dividend on the ordinary shares of 5 per cent. for the current year, payable on July 31.

SPECIALLOID, LIMITED, manufacturers of pistons, piston rings, and gudgeon pins, of Leeds (Yorks)—Final dividend of 15 per cent., as forecast, makes 25 (20) per cent. for the year to April, 1961. Net profit increased to £53,334 (£45,464), after tax of £60,911 (£44,412).

EDWARD G. HERBERT, LIMITED, machine-tool makers and factors, of Manchester—Net profit for the year to March 31, 1961, was up slightly from £5,781 to £5,841, after tax of £6,516 (£5,446). The dividend is raised to 10 (8½) per cent. The present year has started with a substantial order-book.

S. INSTONE & COMPANY, LIMITED—Group net profit for the year to March 31, 1961, amounted to £12,856 (£7,622), after tax of £6,769 (£4,536). In view of the present difficult shipping conditions, the board has decided not to recommend a dividend. The last payment was 8 per cent. for 1957-58.

MIRRLEES WATSON & COMPANY, LIMITED, engineers, iron and non-ferrous founders, etc., of Glasgow—Group profits fell from £142,461 to £69,653 in the year to March 31, 1961, and the dividend is halved to 7½ per cent. After tax of £44,069 (£67,127), the net balance is £25,584 (£75,334).

MCKECHNIE BROS., LIMITED, stampers and piercers, makers of extruded non-ferrous metals, etc., of Birmingham—A final dividend of 8 per cent. is foreshadowed on capital increased by the recently proposed one-for-two scrip issue and is equivalent to the final of 12½ per cent. paid last December on the present capital.

MINERALS SEPARATION, LIMITED—Group profit for 1960 expanded from £1,108,161 to £1,331,219, and after tax of £696,605 (£511,386) the net profit is up from £596,775 to £634,614. The dividend is raised from 1s. to 1s. 3d. per 5s. share on the £2,500,000 capital as increased by a one-for-four rights issue, with a final of 11d. per share.

ANDERSON, BOYES & COMPANY, LIMITED, electrical, mining and mechanical engineers, of Motherwell (Lanarkshire)—Mr. James Anderson, chairman, states that the level of orders continues high both for home and export markets, and steps have been taken to increase output through creating additional capacity at Motherwell and Glenrothes (Fife).

WYNDHAM ENGINEERING COMPANY, LIMITED, welders and manufacturers of steel fabrications, of Cardiff—The company has received an approach for the acquisition of all the ordinary shares. The approach is under consideration and a further communication will be sent to shareholders in due course. In the meantime, shareholders are advised not to sell their shares.

B. WHITAKER & SONS, LIMITED, brick manufacturers and quarry owners, of Leeds—In the current year all branches are operating well. Orders are satisfactory and if the present progress is continued, the results should show a further improvement, says the chairman, Mr. C. J. Page. Group net profit for the year to September 30, 1960, was £84,462 (£37,290). Dividend is 12½ (10 equivalent) per cent.

HEENAN, LIMITED GROUP—Approval is being sought from shareholders to allow the board to make application to London and Birmingham Stock Exchange for permission for quotation for ordinary shares totalling £46,875 in nominal value, which may have been, or may hereafter be, issued pursuant to options granted to certain executive directors of the company and of its subsidiaries. An extra-ordinary meeting will be held in Worcester on June 26.

S. RUSSELL & SONS, LIMITED, mechanical and structural engineers, of Leicester—Mr. George Russell, the chairman, says that the board has decided on a rebuilding plan to cost about £125,000, of which the major part will be met by the issue of 374,000 ordinary 5s. shares. These shares are now offered to ordinary holders on June 1, in the proportion of one-for-four. The directors forecast a dividend of 15 per cent. for the year ending March 31, 1962, on capital as increased by the present issue.

GLACIER METAL COMPANY, LIMITED, manufacturers of plain bearings, bearing metals, die castings, etc., of Wembley (Middx)—Projects involving an investment of £450,000 are listed by the chairman, Mr. W. B. D. Brown, in his annual statement with the accounts. This did not cover all future investments nor did it relate to the current year. Expanding trade would also make demands for increased working capital, so that it might be necessary in the not too far distant future to raise additional capital.

FAIRBAIRN LAWSON COMBE BARBOUR, LIMITED, textile machinery manufacturers, etc., of Leeds (Yorks)—Trading accounts for the year to March 31, 1961, should break even or show a small profit. This compares with a loss, before tax and other non-trading profits, in the previous year of £28,729 and a loss of £190,231 in 1958-59, when the Dundee factory closed down. Important steps have been negotiated regarding diversification, but projects will not "produce any serious revenue this financial year."

EFCO, LIMITED (formerly Electric Furnace Company, Limited), London, S.W.1—Dividend for the year to March 31, 1961, is being effectively raised to 11¼ (10) per cent., with a second interim, in lieu of a final, of 7½ per cent. on capital doubled by a scrip issue. The more liberal distribution is justified, the directors state, in view of the approaching completion of the works construction programme which the company has been carrying out during the last three years and financing largely out of retained profits.

WHESSOE, LIMITED, manufacturers of capital plant for the oil, atomic power, gas and chemical industries, of Darlington—Trading profits contracted from £990,130 to £626,254 in the year to March 31, 1961, but the total dividend is maintained at 27½ per cent. with a final of 22½ per cent., from a net balance of £331,254 (£440,130), after tax of £295,000 (£550,000). Orders on hand are at a high level, it is stated, and gross work in progress has increased, but the effect of lower price levels will continue to be felt.

FIRTH CLEVELAND, LIMITED—Mr. C. W. Hayward, chairman and managing director, states that the steel companies experienced a high level of activity at the start of 1960 and had a successful year, although towards the end of the period there was some slackening in demand. A "substantial" tonnage of speciality steel was exported to the US during the year and similar success was achieved elsewhere. All departments of the subsidiary Richard Hill, Limited, had record production and sales, and new export

markets were entered successfully. Group exports were higher in 1960 and amounted to 18 per cent. of turnover, excluding the retail division.

WALSALL CONDUITS, LIMITED, electrical switchgear and conduit manufacturers, etc., of West Bromwich (Staffs)—Group sales for the current year have continued to rise, but at the same time profit margins are being narrowed, as a result of increased costs and keen competition, states Mr. C. G. Maisey, the chairman. Efforts to absorb rising costs are being made by increased productive efficiency and expanding turnover, he adds. Export trade was somewhat disappointing 1960 and, so far this year, the same remark applies.

BRITISH BELTING & ASBESTOS, LIMITED, Cleckheaton (Yorks)—Though he makes no attempt to forecast 1961 profits, Col. Sir William Fenton, the chairman, tells members that, with minor exceptions, the company is assured of full employment throughout the year. Last year was one of reorganization and development for the parent company and, while it continues to grow, Sir William points out, a significant feature is the increasing importance of the subsidiaries, which in 1960 were responsible for 35 per cent. of the group's profit, before tax.

ELLIOTT-AUTOMATION, LIMITED—Group turnover increased by 25 per cent. to £20,000,000 in 1960, and the chairman, Mr. R. E. F. de Trafford, reports an encouraging upward trend in sales and profit during the current year. "We are confident we can look forward to a further improvement in our results for 1961," he states. Despite the large growth in turnover during the past year, the group's order-book has risen steadily since the last report. "We can, therefore, look forward to further expansion in the volume of our business," the chairman adds.

JONAS WOODHEAD & SONS, LIMITED, manufacturers of laminated and coil sorings, torsion bars, etc., of Leeds—Final dividend of 10 per cent. makes 15 per cent. for the year to March 31, 1961. Adjusting for a one-for-10 scrip issue, the previous 7½ per cent. actual payment for six months was equivalent to an annual rate of 13.6 per cent. Group profits of £225,162 compare with £135,686 for the previous six months period. After tax of £92,400 (£59,800) the balance is £132,762 (£75,886) of which £127,817 (£73,860) is attributable to the company.

AMBROSE SHARDLOW & COMPANY, LIMITED, makers of drop forgings and machined crankshafts, of Sheffield—Consolidated trading profit for the year ended March 31, 1961, advanced from £781,860 to £968,590, and the net profit from £416,306 to £472,118, after tax of £496,472 (£375,554). The dividend is raised from the equivalent of 13¼ per cent. to 15 per cent. with a final of 11 per cent. The directors state that demand for the company's crankshafts has been sustained, and the current outlook is one of continued activity at a satisfactory rate.

BUTTERLEY COMPANY, LIMITED, bridge builders, general engineers, ironfounders, etc., of Derby—Mr. M. F. M. Wright, the chairman, in his annual statement, explains that the sale of Air Products (Great Britain), Limited, followed the realization that the construction of plants, etc., necessary for that company's development required very much larger sums than originally contemplated. The sale will enable certain developments in Butterley Company's existing line of business to be carried out more easily and the return is likely to be in excess of anything that might be anticipated from Air Products for many years to come.

CHUBB & SONS, LIMITED—Directors propose a scrip issue of one 4s. "A" ordinary share for every four ordinary and/or "A" ordinary shares held on June 23. It is also proposed to increase the capital to £2,000,000 by creating a further 3,500,000 unclassified 4s. shares additional to the 765,000 authorized but not issued. The scrip issue will require 808,750 of these shares. The balance, says Mr. G. C. H. Chubb, the chairman, will be available for issue either for cash should the company be able to employ additional capital to advantage, or by way of consideration for other businesses which may be acquired. An extra-ordinary meeting is called for June 28 to consider the proposals.

MACREADY'S METAL COMPANY, LIMITED—Chairman and managing director, Mr. R. E. J. Macready, in his statement at Wednesday's annual meeting, said that the net profit for 1960, of £288,044 (£197,776) before taxation, is a record. A final dividend of 20 per cent. is recommended. Extensions to the main premises have begun and it is expected they will be available for occupation in January, 1962, at the approximate cost of £150,000. In addition the company is buying an extensive freehold site opposite the main warehouses at a cost of £92,000. The site will be developed to accommodate the stocks of hot rolled carbon and alloy steels now held in rented warehouses at King's Cross, and will permit, subsequently, the stocking of additional quantities of steel for the engineering industry.

G. & J. Weir's Trading Position "Difficult"

AT last week's meeting of G. & J. Weir Holdings, Limited, Viscount Weir, the chairman, said that taking all factors into account, "our position is still a difficult one, and I do not expect 1961 to be a good year for our group's trading. However, I do not wish to give an impression of undue pessimism. While measured in terms of the return on capital employed, our results may not show an improvement, I would, nevertheless, expect that we shoud be able to maintain our current rate of distribution."

Both G. & J. Weir, Limited, and Drysdale & Company, Limited, the principal trading subsidiaries, will continue to work below capacity, added Viscount Weir, due to the dearth of orders for delivery during 1961 and despite some improvement during the early part of the year, but he expected that most, if not all, order-books would show a material measure of improvement.

He referred to the company's interest in the offer made by Booker Bros. McConnell & Company, Limited, for the purchase of Pulsometer Engineering Company, Limited, group, under which it has been arranged, in the event of the offer being successful, that G. & J. Weir will acquire certain Pulsometer assets. This, he said, would extend the interest in certain lines of pumping and other equipment which the company had not previously attempted to develop.

Mr. H. T. Collinswood, chairman of Pulsometer Engineering, tells holders the board considers there is nothing contained in recent circulars which makes him and his co-directors wish to reconsider their decision recommending acceptance of the offer made by Booker Bros. He points out that while, for technical reasons, the offer was expressed as being made by Bookers, it is in effect, a joint offer by Booker and G. & J. Weir Holdings. The cash offer, 12s. per 5s. ordinary and £100 for every £100 preference, expired on Wednesday.

The disposal of one or more of the group's businesses has been explored and the board decided that such a course would not have produced as much as 12s. per ordinary share.

NEWS IN BRIEF

WORKS MANAGER of the Forgrove Machinery Company, Limited, a subsidiary of Baker Perkins, Limited, Mr. Gilbert Ramsden gave an address on "Pride and Prejudice in Industry" at a meeting of the Leeds Junior Chamber of Commerce.

A COMMEMORATIVE STONE in Manchester University's new £1,250,000 Simon Engineering laboratories—named after the late Lord Simon of Wythenshawe, chairman of the University Council for 17 years—was unveiled by Lady Simon on Tuesday.

TO AVERT the closing of some mines of Dominion Steel & Coal Corporation, Limited, the subsidy on Nova Scotia coal will be continued to August 1, 1962. The subsidy, of $1 a ton, was put into effect a year ago and was due to end this month.

UNDER AN AGREEMENT between Richardson Gears Pty. Limited, of Melbourne, Australia, and David Brown Industries, Limited, Huddersfield, a new Australian-based company, Richardson David Brown Gears Pty. Limited, has been formed.

AN AGREEMENT has been entered into by Denis Ferranti Meters, Limited, with Seshasayee Bros. (Pvt.), Limited, of Tiruchirapalli, India, granting a licence to the India company for the manufacture of electric meters with Denis Ferranti's aid and assistance.

THE Restrictive Practices Court in London on Tuesday fixed October 3 as a provisional date for the hearing of the Steel Hinge Makers' Association agreement. Mr. J. F. Donaldson, QC, for the Registrar, said he understood it could be dealt with very speedily.

A METALLIZING GUN, believed to be the first of its kind to be used in South Wales, has been purchased by A. J. Seward (Engineering), Limited, of Newport (Mon). The gun, which is made by Metro, New York, will be used to prepare the interior surfaces of bearing cases and shells.

GANTRY WORKERS and slingers at the Cwmfelin press works of Richard Thomas & Baldwins, Limited, at Swansea, who struck last Friday over a pay dispute, returned to work on Monday pending further negotiations. They are key workers at the plant, and their action brought the works to a standstill.

THE BRITISH HALF of the cross-channel power cable has been successfully laid by Associated Electrical Industries, Limited, and British Insulated Callender's Cables, Limited. The next stage after the acceptance tests will be joining of the British half with the French section, due to take place on June 21.

TERRITORY covered by the Luton sales office of Alcan Industries, Limited, will from July 1 take in Oxfordshire and the southern portions of Buckinghamshire and Essex, hitherto covered by the London sales office. Mr. J. B. Rayner, who has been manager of the office since its opening, continues in that post.

THE THORNCLIFFE WORKS of Newton, Chambers & Company, Limited, were visited on Tuesday and Wednesday by 30 oversea distributors of the firm's excavators and cranes who held a conference before going to the first International Construction Equipment Exhibition at the Crystal Palace which opened yesterday (Thursday).

A DROP OF 7,000 tons in exports of iron and steel goods through Middlesbrough Dock is reported for the four weeks ended May 22. No iron ore was imported during the period but the intake of other ores rose steeply to over 23,000 tons. At Hartlepools Dock exports of iron and steel goods were over 4,000 tons for the same period and this type of trade, together with exports of basic slag and limestone, is developing to compensate for the continued decline in exports of coal.

LONG SERVICE awards were made to 83 employees of W. & T. Avery, Limited, weighing, counting and testing machine manufacturers, of Birmingham, on Monday. Eleven employees received presentations for over 50 years' service and the managing director, Mr. Austin Morley, received an award for over 40 years' service with the firm.

CONTRACT WORTH about £4,000,000 for the delivery of a nylon fibre plant has been awarded to Highpolymer & Petrochemical Engineering, Limited, the company jointly owned by Vickers, Limited, and Herr Hans J. Zimmer, by V/O Techmashimport. Agreement was reached on this contract during the British Trade Fair in Moscow.

WINNER OF THE 1960 Paul W. and Florence B. Litchfield award as "best all-round salesman" of the Goodyear International Corporation, Mr. F. W. Jung, achieved his success in one of the world's toughest areas—the Congo. Mr. Jung played a big part in the withdrawal of the Goodyear company from the Congo when that country's troubles forced the move.

TOOLS which have been given by Stanley Works (Great Britain), Limited, Sheffield, for the Cambridge and Sheffield Sahara Expedition 1961, were collected on Thursday by two members of the expedition, Mr. R. A. G. Savigear, lecturer in Geography, and Dr. D. W. Humphries of the Geology Department at Sheffield. The gift included screwdrivers, hammers, drills, and knives.

COAL CONSUMPTION by the gas and electricity industries in the north has increased this year, but the iron and steel, and engineering industries are using less, the Northern Regional Board for Industry reports. In the first 13 weeks of 1961, the electricity industry used 1,350,100 (1,103,900) tons; gas, 250,200 (228,700) tons; iron and steel (excluding ironfoundries), 128,300 (142,500) tons; engineering, 34,800 (38,900) tons; and other industries 702,600 (669,400) tons.

PREVIOUSLY MANUFACTURED by the Solartron Electronic Group, Limited, Farnborough (Hants), the "Solarcheck" high-speed checkweigher, is now to be manufactured and sold by Electronic Control Engineering, Limited, Burgess Hill (Sussex). By an agreement between the two companies, Electronic Control Engineering has the sole manufacturing and selling rights for this equipment and will also take over all the maintenance and after-sales service.

A SIMPLER PROCEDURE for preserving the pension rights of certain employees moving from one contracted-out employment to another either under the same employer or within a group of employers all using the same pension scheme is proposed in draft amendment regulations published by the National Insurance Advisory Committee. Copies of the draft regulations, price 6d., may be obtained from the Stationery Office, or through any bookseller.

GOLDEN JUBILEE export conference of the British Electrical and Allied Manufacturers' Association is to be held in London on October 5 & 6. The President of the Board of Trade will speak at the conference luncheon, and on the first day there will be papers by authorities on electrical engineering and problems of trading. On the second day there will be a series of discussion groups on subjects of importance to exporters.

Board Changes

Executive Chairman of A. Reyrolle

CHANGES in the structure of its top management are announced by A. REYROLLE & COMPANY, LIMITED, manufacturing electrical engineers, of Hebburn (Co. Durham). As from July 1 Mr. H. H. Mullens, who joined the company in 1954, will be executive chairman and relinquish the position of managing director. Mr. J. Bennett, general manager for the last two years will become managing director.

Mr. Mullens received his technical training at the Gateshead works of Clarke, Chapman & Company, Limited, and became managing director of Reyrolle in 1954. Mr. Bennett has been with the company for more than 40 years. He is a director of the Bushing Company, Limited, Dorrator Iron Company, Limited, Parolle Electrical Plant Company, Limited, and other associated companies.

THERMOTANK, LIMITED—Mr. James Scott has been appointed a director.

AIR PUMPS, LIMITED—Mr. L. Klein has been appointed sales director.

ANGLO METAL COMPANY, LIMITED—Mr. J. C. Hitchcock has been appointed to the board.

STEIN & ATKINSON, LIMITED—Mr. George Talbot has been appointed deputy managing director.

PATERSON ENGINEERING COMPANY, LIMITED—Mr. John V. Sheffield has been appointed chairman.

ADAMANT & WESTERN ENGINEERING COMPANY, LIMITED—Mr. F. V. Waller has been appointed deputy chairman.

WORSLEY MESNES IRONWORKS, LIMITED—Mr. C. Richardson, a director, and Mr. J. Turner, the secretary, have resigned. Mr. J. B. Forbes has been appointed secretary.

RUBEROID COMPANY, LIMITED—Mr. T. Alison has been appointed director of sales, and Mr. J. Grant director of development. Col. T. H. Hunter-Brown has been appointed director of contracts, and Mr. W. M. Parsons director of production.

DUNLOP RUBBER COMPANY, LIMITED—General Sir Brian Robertson, recently chairman of the British Transport Commission, has joined the board. For a number of years before 1940 he was managing director of the Dunlop subsidiary in South Africa.

FOSTER ELECTRICAL SUPPLIES, LIMITED—Mr. A. C. Ball, London branch manager, Mr. E. A. Ellerton, commercial manager, and Mr. A. M. Taylor, have been appointed to the board of the company, a member of the Metal Industries, Limited, group.

C. H. JOHNSON (MACHINERY), LIMITED—Mr. R. O'Neill, joint managing director, has retired after 48 years with the company. Mr. R. A. Battine has been appointed sales director, contractors' plant division, and Mr. C. H. Neeson sales director, materials handling division.

REICHHOLD CHEMICALS, LIMITED—Mr. G. S. Bache has been appointed chairman and Dr. G. Swann, assistant managing director of the subsidiary, Beck, Koller & Company (England), Limited, a director to fill the vacancy on the board as a result of the recent death of Mr. W. H. Breuer.

MELTHAM SILICA FIREBRICK COMPANY, LIMITED—Mr. George H. Johnston has been appointed managing director of the company, one of the Genefax group. General manager since 1954, Mr. Johnston started his career in the refractories industry at the silica brickworks of the Consett Iron Company, Limited, and the Newbould Silica Firebrick Company, Limited, Australia. He joined General Refractories, Limited, in 1934.

FRANK H. AYLING, LIMITED—Mr. A. J. Bray has been appointed to the board and to the board of its subsidiary companies, Bribond, Limited. Frank H. Ayling, Limited, is a subsidiary of Enstock Trust, Limited, and Mr. Frank H. Ayling is chairman and managing director of Crawley Industrial Products, Limited, mining machinery manufacturers, etc., and chairman and managing director of several other companies.

WM. DOXFORD & SONS, LIMITED—Sir Henry W. Smith, chairman, Mr. A. J. Marr and Mr. R. C. Thompson, directors of Sunderland Shipbuilding Dry Docks & Engineering Company, Limited, have been appointed additional directors. Sir Henry has been appointed vice-chairman. Mr. G. C. L. Thompson and Mr. R. P. Key have resigned from the board. A merger of the two companies was approved by Wm. Doxford shareholders last week.

Mr. Robens' Confidence is Growing

IN introducing the chairman of the National Coal Board in "Workshop," the magazine programme "about Britain at work," in the BBC Home Service last Friday, George Scott reminded Mr. Robens that when he last appeared in the programme he had spoken optimistically about the future of the coal industry. That was last autumn before he had taken up his appointment as the board's chairman. Was he still optimistic or had he changed his views in the light of his experience as chairman of the board?

Mr. Robens said he had certainly not changed his views; in fact, he was more optimistic than before, having now had an opportunity of taking a close look at the industry from the inside. He had got good reason to be optimistic. They measured the success of the industry by two factors—productivity and the mechanization programme. The speed with which they were moving towards their targets in both respects was most encouraging.

Among a number of subjects, Mr. Scott referred to the question of supplies of coking coal to the steel industry, mentioning the recent application of the Steel Company of Wales, Limited, to import "a fairly small quantity" from the United States. He felt that opposition to the company's application was, in effect, opposing efficiency and cheapness in the steel industry.

Mr. Robens explained that it was the long-term consequence of importing American coal that was important. Indeed, it was vital because if coal were imported it would be necessary to close down certain pits at present producing coking coal for the steelworks. And that would mean he would have to tell the miners concerned they were not wanted, and the lost capacity would mean that we would then be at the mercy of the American producers.

"Don't run away with the idea that the steel industry can buy its coking coal cheaper than we can produce it," Mr. Robens said. "It's only small parcels we are talking about." He emphasized that once we had lost the productive capacity we had lost it for ever.

G. L. WILLAN, LIMITED, alloy steel manufacturers, of Sheffield, is to build a new factory at Catcliffe, Rotherham.

REFRACTORY CONCRETE

The ADAPTABLE Refractory Material—SAVES TIME AND MONEY

A MUST for FURNACE & BOILER FOUNDATIONS
HEAT-RESISTANT FLOORS
FURNACE DOORS & DAMPERS
FLUES & FLUE-PIPE LININGS
KILN CAR & BOGIE TOPS
COKE OVEN DOOR LININGS
BURNER BLOCKS

AND 101 OTHER REFRACTORY USES

Refractory Concrete (stable under load up to 1350°C) is made with crushed firebrick and Ciment Fondu Ready for any purpose in 24 hours

CIMENT FONDU
Regd Trade Mark
ALUMINOUS CEMENT

USE SEGAR 250
(An iron-free white calcium-aluminate cement)
for
Super Duty and Special Conditions of:
Higher temperatures up to 1800°C
Reducing atmospheres
Resistance to slag attack
Resistance to products of combustion

Write for Booklets 'REFRACTORY CONCRETE' and 'SECAR 250'

LAFARGE ALUMINOUS CEMENT COMPANY LIMITED, 73 BROOK STREET, LONDON, W.1 . Tel: MAYfair 8546

AP 81

Miners Warn Again on "Decentralization"

WARNING about the miners' reactions to proposals for decentralizing the National Coal Board was given by Mr. Will Paynter, general secretary of the National Union of Mineworkers, at the annual gala of South Wales miners at Cardiff on Saturday. Mr. Paynter said that the intention, which he claimed had not been abandoned, was to denude the NCB of its centralized power and control of the industry, and to concentrate it on divisional boards, which could result in the revival of competition between coalfields.

"We will never allow any Government, whatever it is, to restore into this industry the competitive position that we had in the grim 1930s. We are not going back to the old days, and there will be the maximum resistance to any attempts to denude nationalization of its social and political significance," Mr. Paynter said. "If the aim is to restore competition between district and district, they can face in this country what they faced in 1926—the mass of miners resisting policies of that kind by the most decisive form of action of which we are capable."

Referring to the application by the Steel Company of Wales, Limited, to import American coking coal, Mr. Paynter said that the company should remember that when there was a scarcity of fuel in Britain, the steelmaker did not ask to import US coal because it was dearer, and said it was the responsibility of the NCB to do so. The NCB imported American coal at world prices, and sold it in Britain at deflated inland prices, losing a total of £70,000,000.

A resolution at the meeting, which followed the march of miners through Cardiff, called for "the most radical measures" to deal with pneumoconiosis, a higher standard of safety and supervision in mines, and a demand for an immediate reduction in working hours to seven underground and eight on the surface, with a six-hour day "at the earliest possible date," together with three weeks' annual paid holiday instead of a fortnight.

Among other speakers at the rally were Mr. Will Whitehead, president of the South Wales Area of the NUM, and Mr. Frank Cousins, general secretary of the Transport and General Workers' Union. The general secretary of the French Miners' Union, M. Leon Delfosse, the general president of the Australian Miners' Federation, Mr. Bill Parkinson, and representatives of the Yorkshire and Derbyshire miners were also present.

RESTRICTIONS BLAMED FOR FAILURE OF SMALL MINE

RESTRICTIONS placed on the output of small mines was a reason given by Mr. Thomas Walwyn Roderick, a mining company director of Abercrave, for his bankruptcy. At the Neath Bankruptcy Court he said his failure was caused by "loss of investments in a mining company that is insolvent as a result of the output of small mines being restricted because of excessive national coal stocks and liabilities occurred on its behalf."

He said he bought a small mine for £2,500 in 1959. Its output was 50 tons a week. In March, 1960, the Coal Board restricted the output of his mine to 21 tons a week and royalties increased from 9d. to 6s. a ton. The business operated at a loss but he continued, as he was told restriction was only temporary.

More Pay for Yorkshire Pit Officials

PAY rise of 10s. 6d. for colliery junior officials in the North-Eastern Division of the NCB, back dated to January 1, will cost the board an extra £90,000 in wages. The increase became effective last Friday, and is likely to be followed by a further rise for some of the men.

When the latest increase was agreed by the Yorkshire Deputies' Association and the National Coal Board, the board agreed to allow negotiations for a further 9s. a week for overmen.

The present increase is the second received by junior officials within the past 12 months, the last being an increase of 15s. 6d. in September, 1960. The pay rates for junior officials in Yorkshire now are: Shotfirers, £17 17s. 6d. a week; Grade II deputies, £18 7s. 6d.; Grade I deputies, £19 19s.; overmen, £21 0s. 6d.; Grade I overmen, £22 1s.

Winding enginemen are to receive an extra 1s. 9d. a shift on top of the present rate of 42s. 6d. a shift as a result of an agreement reached between the NCB and the National Union of Mineworkers. The 3,500 men affected will get an average increase of between 14s. and 15s. a week. The increase has been agreed in place of a claim for a quarter of an hour cut in shift times.

The NUM executive meeting in London last week confirmed the action of the union's national officials in agreeing to talks with the breakaway union, the National Union of Winding Enginemen, providing there was agreement by the NUWE that there would be no "poaching" of members while the talks went on. The offer has been rejected by the NUWE, but NUM officials said the offer remained open.

Youth Employment Officers See for Themselves

GROUP manager of Askern and Bentley Collieries, Doncaster Area, North-Eastern Divisional Coal Board, Mr. C. W. Dickens, told youth employment officers from Doncaster Borough and Doncaster West Riding who last week toured the training galleries and the coal face at Bentley Colliery, that youths entering the coal industry today have a better safety sense than their fathers.

Bentley pit is one of the two centres in the Doncaster Area where apprentices receive initial instruction in working below ground. Mr. Dickens said: "Our aim here is to cut out accidents and to improve efficiency. Beginners are taught fire-fighting, first-aid, timber setting, haulage, and other tasks. Their fathers, if they came down the pit, did not get the same opportunities for training."

Durham NCB Golf Competition

ELEVENTH annual golf competition for the chairman's cup will be staged by No. 6 Area, Durham Divisional Coal Board, Golfing Society on Sunday, July 16, over the South Moor golf course. In the afternoon there will be a two-ball foursomes bogey competition.

The cup, which was presented by Mr. E. H. D. Skinner, former chairman of the Durham Division, may be held only by a golfer employed in the division, but any NCB employee can qualify for other prizes.

TO YOUR PRECISE REQUIREMENTS

*

Whatever your transmission problems we design gears for any power—any speed. More than 50 years of specialised experience at your service.

*

THE POWER PLANT COMPANY LIMITED

WEST DRAYTON, MIDDLESEX

Telephone: West Drayton 2626 (4 lines) Telegrams: Roc. West Drayton

ECSC Coal Output Down on Last Year

COAL production by the member countries of the European Coal and Steel Community last month reached 19,876,000 tons, against 18,640,000 tons in April and 19,617,000 tons in May, 1960. The increase in production last month of 6.3 per cent. compared with April, is principally due to the Federal Republic of Germany which mined 1,000,000 tons more than in the preceding month. In addition, there have been modest increases in France and Belgium. Even so the total community output for the month of May was not up to that of March, 1961—20,852,000 tons—the best this year.

During the first five months of the current year, production is 1.6 per cent. lower than that for the corresponding period of 1960. In view of the decrease of unemployment in the mines in the January/May period compared with that of 1960, the fall in production of 1,571,000 tons, must be attributed to reductions in capacity and reduction of the working force.

High Authority of the ECSC has decided to reduce the rate of the levy on coal and steel producers, from which it derives its revenue, from 0.35 per cent. to 0.3 per cent. for the period July, 1961, to June 30, 1962. The levy is calculated on the basis of the annual production of enterprises under the jurisdiction of the community. This decision has been reached after consultation with the European Parliament, and after taking into consideration its wish not to reduce the level of the community's financial reserves.

The committee of presidents of the European Parliamentary Assembly at its session in Strasbourg from June 26 to July 1, 1961, will include in the items to be discussed the report by M. Poher on the control by the High Authority in relation to the fund for imported scrap, and the report by M. Gailly on the European statute of miners, among a large number of items.

COAL AND STEEL MEETING BY BRITAIN AND THE SIX

THE 11th meeting of the Council of Association between Britain and the High Authority of the European Coal and Steel Community was held at the Board of Trade yesterday (Thursday). The British delegation was led by Mr. Richard Wood, Minister of Power, and included Mr. Niall Macpherson, Parliamentary Secretary, Board of Trade, Mr. Alfred Robens, chairman of the National Coal Board, and Sir Cyril Musgrave, chairman of the Iron and Steel Board.

The High Authority delegation consisted of M. Dirk Spierenburg, senior vice-president, and three members of the High Authority.

The Council meets at intervals alternately in Luxembourg and London to discuss matters of common concern to Britain and the Community in the fields of coal and steel production, processing, and marketing, especially trade in the two commodities between Britain and the Community.

COAL AND COKE shipments from the River Wear in April were 177,006 tons, a decrease of 799 tons on 1960. Total for the first four months of the year fell to 803,629 (844,629) tons. Foreign shipments in the same period are down by 1,724 tons, and coastwise trade by 39,682 tons.

Coal Chartering

ALTHOUGH quite a fair inquiry is still noted on Japanese account, the market is quieter and a lesser volume of tonnage has been taken up, with rates showing some fluctuation. In the coal section, late June/July 10 cancelling, 11,000 tonner has been fixed Hampton Roads/Japan at $9.15, although 14,000 tons similar position was fixed at $9.35 and again for late June/July 15 a 19,000 tonner has been taken for Moji or Tobata at $9.25, also 14,000 tons to Tobata only for June 15/25 at $9.60.

Hampton Roads/Rio de Janeiro obtained a 14,000 tonner for August loading at $6.15 and some interest is maintained for forward loading. There is also some demand for Italy and recently Roads/Genoa fixed at $4.40 for July. Tonnage has been taken from Newcastle, NSW, to Miike at 43s. f.i.o., also for July, and from South Africa, Durban/Rangoon reports 55s. 3d. f.i.o. for 10,000 tons middle June shipment.

The UK coal trade to the Mediterranean is quiet, although subject to stem some miscellaneous business is available. On the other hand there is still quite a fair demand in the coasting sections.

North British Locomotive's Brighter Future

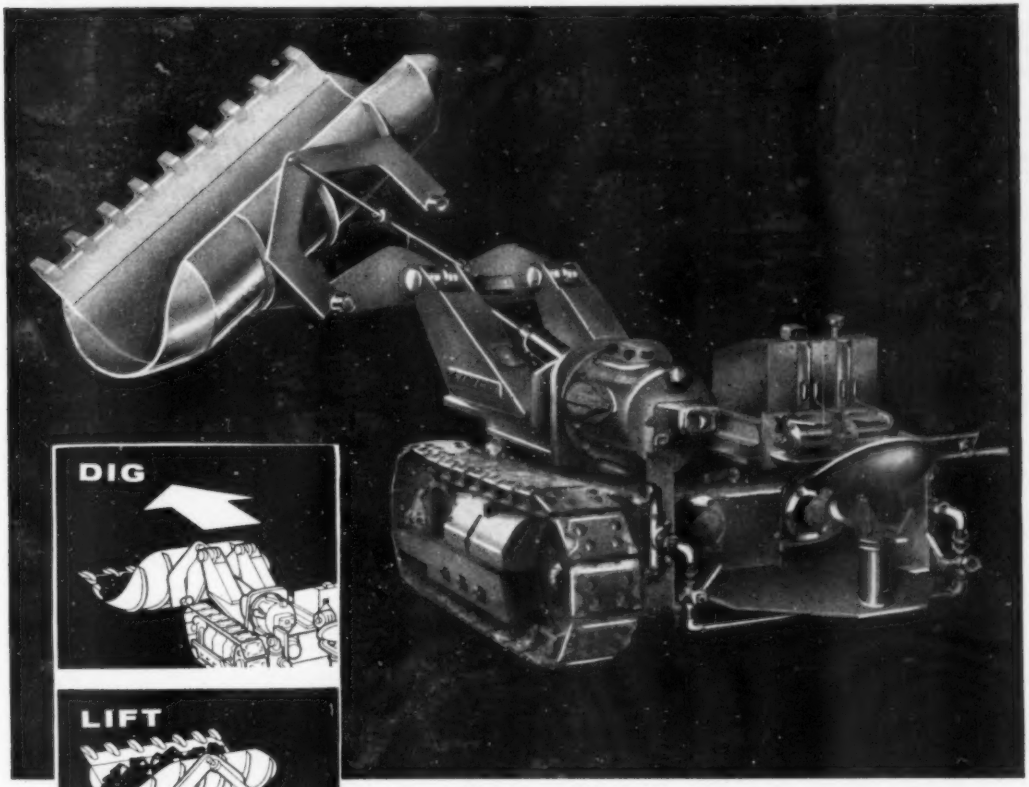
CONCENTRATION of the work of the North British Locomotive Company, Limited, at the Queen's Park Works, Glasgow, will be completed this year with consequent and substantial reduction in costs and increase in management efficiency, the chairman, Mr. T. Coughtrie, states. The capacity of the plant is such that the company should be able to produce in one works instead of three an output equal to that despatched in 1960, he adds. Lease or sale of the administration building is under negotiation.

He points out, however, that locomotive orders are increasingly difficult to secure. It was a particular disappointment that NBL was passed over in a contract for diesel electric locomotives for the Scottish Region. Great effort is made to obtain a share of any business to be placed at home or abroad. The plant for production of hydraulic transmission units and torque converters has been extended to cope with orders in hand and expected. Other applications for such equipment are being sought. Several new projects are under review.

NEW ENGINEERING APPRENTICE COURSE IN SCOTLAND

AS an experiment, a scheme of full-time apprenticeship training is to be introduced next year in Glasgow with the aim of establishing whether the standards of craftsmanship can be raised by integrating practical and theoretical training. It is expected that the course, of three years' duration, will be provided in the former administrative building of the North British Locomotive Company, Limited, in Springburn, Glasgow, which is being acquired by Glasgow Corporation for conversion to a technical college.

The scheme is regarded as particularly suitable for small engineering firms, who have limited facilities for training craftsmen. Employers are to be asked to support the apprentices financially during the course period.



ANNOUNCING THE NEW EIMCO 623 side dump loader

for modern mining

- For coal face loading
- Mechanised stable holes
- Mechanised pillar and stall working
- Back ripping and general repair work

For further details write to

EIMCO (GREAT BRITAIN) LTD.

Team Valley, Gateshead 11, England. Tel: Low Fell 7-7241. London Office: Princes House, 190 Piccadilly, London, W.1. Tel: REGent 2184.

Operated either by compressed air or flameproof electric motors, the 623 Side Dump Loader with smooth hydraulic power digs, lifts and discharges sideways onto scraper or belt conveyor.

The big 21 cu. ft. Bucket lifts 2 tons and tips up to 50° to discharge. Front discharge bucket and other materials handling attachments make this machine even more versatile.

Backed by Eimco's years of experience in mining the new 623 Side Dump Loader is the answer to low cost face mechanisation.

P6439

CLASSIFIED ADVERTISEMENTS

PREPAID RATES: Fifteen words for 7/6 (minimum charge) and 4d. per word thereafter. Box Number 2/6 extra per insertion (including postage of replies). Situations wanted 2d. per word throughout.

Advertisements accompanied by a remittance and replies to Box Numbers should be addressed to the Advertisement Manager, Iron and Coal, John Adam House, 17/19, John Adam Street, London, W.C.2. If received by first post Tuesday, they can normally be accommodated in the next Friday's issue.

SITUATION WANTED

QUALIFIED ENGINEER with first class connections in many areas of the N.C.B. offers his services for full- or part-time technical sales representation in this industry and also heavy engineering. Experienced negotiator, situated in the Midlands. Box QE408, IRON AND COAL.

SITUATIONS VACANT

MINING SURVEYORS wanted for colliery development contracts in central Scotland. Young men fully experienced in instrument work. Write for interview giving details to MOWLEM (SCOTLAND) LTD., 64 Frederick St., Edinburgh 2.

SENIOR ENGINEER with practical experience in Colliery Engineering required by large British Agency for service in India for an initial period of three years.

Partly furnished accommodation, coal, light and medical facilities will be provided free, and also first class sea passage for wife and children.

Total emoluments will be equivalent to £1,750 per annum, at the current rate of exchange but higher commencing emolument may be paid depending on qualifications and experience.

Applicants should give full particulars of their practical and technical training along with copies of testimonials. Apply Box No. 4132, c/o CHARLES BARKER & SONS LIMITED, Gateway House, London, E.C.4.

MINING EQUIPMENT MANUFACTURERS with expansionist programme seek to appoint a

SALES MANAGER

This is a post of high responsibility and aspiring candidates should have previous Sales Management Experience. The preferred candidate will probably be in the 35-40 age group, the holder of a degree in mining and/or 1st class Certificate of Competency, and possessing energy, enthusiasm and drive essential to the fulfilment of this post.

Applications, in strict confidence, should be addressed to MANAGING DIRECTOR, Box MG409, IRON AND COAL.

EDUCATIONAL

MINING EXAMS. — Expert Coaching by Postal Tuition.—Apply UNIVERSAL MINING SCHOOL (Dept. R.), 50, Connaught Road, Cardiff.

WIGAN AND DISTRICT
MINING AND TECHNICAL COLLEGE

APPLICATIONS are invited for a post as SENIOR LECTURER in the Department of MINING AND GEOLOGY, commencing 1st September 1961 or as soon as possible thereafter. Candidates should have a degree or equivalent qualification, together with good industrial and/or teaching experience. Candidates must be able to teach Fuel Technology or Geology of Fuels to advanced levels and research in either field would be an additional qualification.

Salary in accordance with the Burnham Technical Scale, viz. £1,550 × £50—£1,750 per annum. Full allowance up to the maximum of the scale is given for appropriate experience.

Further particulars and application form will be sent by the undersigned. Last date for the receipt of applications: Friday, 30th June, 1961.

E. C. SMITH,
Principal.

NOTTINGHAM AND DISTRICT
TECHNICAL COLLEGE
BURTON STREET, NOTTINGHAM

Principal:
D. A. R. CLARK, M.Sc.(Tech.), M.I.Mech.E.

APPLICATIONS are invited for the post of

LECTURER IN MINING

Research, post graduate work and Consultancy work encouraged.

Salary in accordance with the Burnham Technical Scale as follows:—

£1,370 × £35—£1,550 per annum. A salary above the minimum will be paid in approved cases.

Further particulars and form of application may be obtained from the Principal to whom completed forms should be returned not later than 30th June, 1961.

MACHINERY WANTED

TWO Siskal Heading Machines required, in good condition, complete with 5 h.p. motors of 440 v. 4.1 amps. Box TS407, IRON AND COAL.

WANTED. 4,000 c.f.m. or 8,000 c.f.m. Turbine or Rotary Air Compressor. 50/60 p.s.i. A.C. voltage 400 or 3,300 or 6,600 volts 3 phase 50 cycles. Box WF406, IRON AND COAL.

MACHINERY FOR SALE

AIR COMPRESSORS for sale. Two 2,500 cu. ft. Belliss Morcom, 100 p.s.i., 550 h.p. motors; 2,300 c.f.m. Holland Rotary 3-stage 150 p.s.i.; 525 c.f.m. Holman, 1940, 119 h.p.; 400 cu. ft. Broomwade EH245, new 1943, 90 h.p.; 390 c.f.m. Broomwade EH240, 100 p.s.i., 60 h.p.; 250 c.f.m. Belliss Morcom, 100 p.s.i., 60 h.p. Also numerous others, and Air Receivers 1 ft. to 9 ft. dia., 100 to 1,000 lb. pressure.

LOCOS—Two Fowler 150 h.p. Diesel; 2 Barclay 80 h.p. diesel, 0-4-0; 2 Ruston 16/20 h.p. 24 in. gauge diesel; 2 Hudson 20 h.p. 24 in. gauge diesel; 4 Logan 3-4 ton 24 in. gauge, battery operated, including two flameproof.

E.O.T. CRANES — 30 ton Marshall Fleming, 29 ft. 3½ in. span, 480 v. D.C.; 25 ton girders and end carriages with 60 h.p. motors, 95 ft. 10 in. span; 25 ton Clyde, 21 ft. 9 in. span, new 1954; 20 ton Morris Goliath, 35 ft. span, 5 ton auxiliary; 20 ton King, 42 ft. 3 in. span, almost new; 20 ton Vaughan, unused, 42 ft. 3 in. span; 10 ton Heywood, 34 ft. span, unused; 2—10 ton, 60 ft. span, 1955; 2—7 ton, 37 ft. span, 1950; 5 ton, 37 ft. span, 1944; 5 ton Henderson, 24 ft. 7½ in. span; 1946; 5 ton King, 29 ft. 3 in. span; 4 ton Morris, 19 ft. span, 220 v. D.C. (3); 3 ton Morris, 149 ft. span, 4 motor.

LOCO CRANES, STANDARD GAUGE—12½ ton Brownhoist steam, 50 ft. jib; 8 ton Wilson steam, 35 ft. jib; 5 ton Smith steam, 50 ft. jib (2); 5 ton Grafton diesel, 35 ft. jib (2); 3 ton Smith steam, 25 ft. jib.

STEEL AND CAST IRON PIPING—Most sizes, ¾ in.—60 in., including 2, 3, 4 and 6 in. Victaulic, 1½ in., 2½ in., 3 in. galvanised, 16 in., 20 in., 24 in., 26 in., 27 in. and 28 in. UNUSED BITUMEN LINED AND COATED WITH JOHNSON COUPLINGS. Special Parcels:

20,000 ft. 6 in. × 3/16 in., ¼ in., 5/16 in., unused steel seamless.

10,000 ft. 8 in. × ¼ in., unused steel seamless.

2,000 ft. 24 in. × ¼ in., unused welded and seamless.

300 × 12 ft. lengths 10 in., unused, cast iron flanged.

List on request.

FRED WATKINS (ENGINEERING) LTD.
Coleford, Glos.
Tel.: Coleford 2271/5.

BRAND New Galvanised Storage Tanks. Suitable for water, oil, paraffin, etc. 125 gallon cap.: £6 10s. 200 gallon cap.: £9 10s. 10 or more tanks, reduced prices. NORMAN E. POTTS (MACHINERY) LIMITED, 151/154, Sandy Lane, Birmingham, 12. Tel.: VIC 1278.

BECORIT (G.B.) LIMITED

require the following

JUNIOR MINING ENGINEER

to operate from their Nottingham Headquarters. Experience with Roof Supports and in Mechanised Mining Techniques will be an advantage. Applicants should also have had experience in an Official Capacity.

MECHANICAL ENGINEERING DRAUGHTSMAN

for new development department, good opportunity for someone able to work on own initiative and taking an active part in all stages of design, development and manufacture. Experience in hydraulics essential, some shop floor experience an advantage.

2 Leslie Road, Gregory Boulevard, Nottingham

MACHINERY FOR SALE—*contd.*

FOR SALE.

SECONDHAND Steel Sections, Channels, Angles and Joints. Secondhand Railway Material.

THE MOTHERWELL MACHINERY & SCRAP CO., LTD.

P.O. Box No. 15, INSHAW WORKS, MOTHERWELL.

Telephone: Motherwell 4536/7/8.
Telegrams: "Scrap" Motherwell.

MISCELLANEOUS

PORTABLE RAILWAY

FIVE miles new 2-ft. gauge 20-lb. Rail-track.
200 Hudson, 2-ft. gauge 27-cu. ft., Steel Side Tipping Wagons.
150 Platform Wagons, 2-ton and 4-ton capacity, 2-ft. gauge.

JOSEPH PUGSLEY & SONS, LTD., Bristol, 5.
Tel.: Bristol 56037.
Grams.: "Piston," Bristol.

VENTILATING TUBE

2,000 YARDS 15 in. dia. Ventilating Tube, 12 ft. lengths. Flanged. New and Unused.
Price 12s. 6d. per yard.

DOWNINGS (BARNSLEY) LTD., Doncaster Road, Barnsley, Yorkshire.
Tel.: Barnsley 3603/4/5

BETTS 12 in. PRODUCTION SLOTTER. Circular table 29½ in. Good throat. MD. 420/3/50. Many other modern motorised machine tools available ex stock. Send for list to: H. BELL (MACHINE TOOLS) LTD., WALTER STREET, LEEDS, 4. Tel. 63-7398.

AUCTIONEERS AND VALUERS

FULLER HORSEY
SONS & CASSELL

Specialists in the
SALE & VALUATION
of INDUSTRIAL PLANT & PROPERTIES of ALL TYPES
SINCE 1807

10 LLOYD'S AVENUE
LONDON E·C·3
TELEPHONE: ROYAL 4861
Rathbone

MICHAEL FARADAY & PARTNERS
Established 1896
CHARTERED SURVEYORS
Valuations of Factories, Works & Plant for all purposes.
Specialists in Rating & Derating of Industrial Premises, Machinery & Plant
40, BROOK STREET, LONDON, W.1
Telephone: GROsvenor 8448 (5 lines)

AUCTIONEERS AND VALUERS —*contd.*

HENRY BUTCHER & CO.

Specialists Auctioneers and Valuers of Plant and Machinery Factory Agents and Surveyors

Fire Loss Assessors

73 CHANCERY LANE
LONDON, W.C.2
Telephone: HOL. 8411 (5 lines)

Sales and Valuations of Industrial Property, Plant and Machinery, throughout the British Isles.

Messrs.
HILLIER, PARKER MAY & ROWDEN
77, GROSVENOR STREET, LONDON, W.1. *Mayfair 7666.*

SUBSCRIPTION ORDER FORM.

To the PUBLISHER

IRON & COAL

TELEPHONE: TRAFALGAR 6171
JOHN ADAM HOUSE · 17/19 JOHN ADAM STREET
ADELPHI · LONDON · W.C.2
TELEGRAMS: "ZACATECAS, RAND, LONDON"

Please send the IRON AND COAL to the address given below until countermanded, for which **£2.12s.0d.** (Home) **£3.0s.0d.** (Abroad) is enclosed in payment of One Year's Subscription.

Name _____

Address _____

Date _____

Cheques and Post Office Orders to be made payable to:—
INDUSTRIAL NEWSPAPERS (FUEL & METALLURGICAL), LTD.

RAILWAY MATERIAL
COMPLETE INSTALLATION OF
NEW SIDINGS
Sites Surveyed and Layouts Prepared
Rails of all sections, and all accessories, tools, plant, etc.
ARMYTAGE & SONS, LTD.
STATION ROAD, WHITTINGTON MOOR, CHESTERFIELD
Phone: Chesterfield 5444 (2 lines)

For **TURBINE PUMPS**
WRITE TO
PULSOMETER ENG. CO., LTD.
READING
LONDON OFFICE:—
PULSOMETER HOUSE,
20/28 LAMB'S CONDUIT STREET, W.C.1.

RAILWAY MATERIALS
SLEEPERS & TIMBERS
Send your Enquiries to
S. RHODES & CO.
BRIGHTSIDE LANE
SHEFFIELD, 9
TELEPHONE 41227 SHEFFIELD
TELEGRAMS "RHODES CO. SHEFFIELD"

* Shaft sinking to any depth by any process including pre-cementation and freezing.
* Shaft deepenings and repairs.
* Shaft furnishings.
* Formation of insets and skip pockets, in brick or concrete.
* High speed drifting.
* Construction of junctions in brick or concrete.
* Concrete lining of underground roadways.
* Ground consolidation.
INTRAFOR MINING ENGINEERS LTD
Registered Office: Waterloo House, East Boldon, Co. Durham. Telephone: Boldon 7296
Successors to James Johnson & Sons Ltd

Barnes & Bell
NEW STEEL DIVISION
SELL
from stock
BARS and SECTIONS,
JOISTS, SHEETS and PLATES
RAILS and ACCESSORIES
BOLTS and NUTS
BARNES & BELL LTD
Established over half a century
1 NEWTON PLACE, GLASGOW, C.3.
DOUglas 6822 (7 lines)
Zenith Works · Barbell Works · Prospect Works
ALL AT COATBRIDGE

SMALLMAN HAULAGE CLIPS
AUTOMATIC DETACHMENT
21 SIZES
TO SUIT ALL CONDITIONS

STEEL THROUGHOUT
Sole Manufacturers:—
JAMES W. SMALLMAN, LTD. ● NUNEATON

Metal treatment
and Drop Forging
A monthly journal devoted to the properties, uses, testing and treatment of special steels and light alloys, and to forging technique in all its branches.
2/6d. per copy, 30/- yearly.
●
Write for a specimen copy to:
Metal Treatment & Drop Forging
John Adam House,
17/19 John Adam Street, London, W.C.2.

Joseph Evans

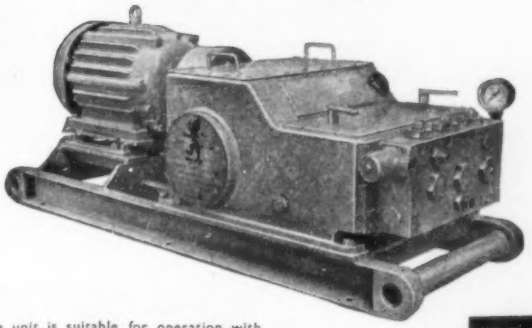
worm drive hydraulic pump

Flow rates up to 25 g.p.m.
Pressures up to 6000 p.s.i.

The pump is the heart of any hydraulic system and the success of the installation depends upon the complete reliability of the pump unit. The fig. 853 W/M unit is specifically designed as a mining hydraulic pump and incorporates many features which are the result of our long experience with mining duties.

Special mention should be made of the following points :

- *COMPACT DESIGN OF MINIMUM DIMENSIONS*
- *STEEL CONSTRUCTION*
- *LOW PLUNGER SPEEDS*
- *MINIMUM WEIGHT FOR EASE OF HANDLING*
- *EASE OF OPERATION*
- *MINIMUM MAINTENANCE*
- *EASE OF DISMANTLING*



The unit is suitable for operation with water, water/soluble oil mixture and hydraulic oil.

JOSEPH EVANS & SONS (WOLVERHAMPTON) LTD.

723-729, Oxford Road, Reading, Berks. Tel : Reading 67182/4
London Office : Pulsometer House, 20/26 Lamb's Conduit Street, London, W.C.1. Tel. : HOLborn 1402
Branch Offices at Glasgow, Bristol, Manchester, Birmingham, Cardiff, Newcastle and Derby.

RECONDITIONED WAGONS

for

WORKS & PRIVATE SIDINGS

- The illustration shows railway wagons undergoing repair at Imperial Works, Newport.

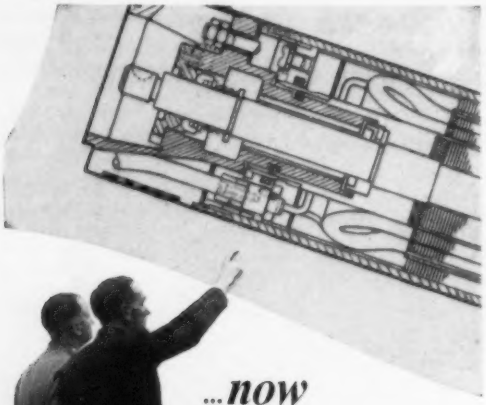
Companies with their own sidings may find it economical to buy reconditioned wagons. In our many depots we have always available a continuous flow of various types of wagons, including mineral, ballast, tanks, bolsters, etc., all capable of giving many years of good service.

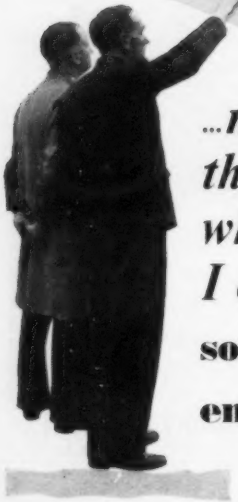
So, whatever type of wagon you want—REMEMBER WARDS MIGHT HAVE IT!

THOS. W. WARD LTD · ALBION WORKS · SHEFFIELD

TELEPHONE 26311 (22 LINES) TELEGRAMS "FORWARD SHEFFIELD TELEX"
LONDON OFFICE : BRETTENHAM HOUSE · LANCASTER PLACE · STRAND · W.C.2

WA/3





...now that's what I call **sound engineering!**

You won't find any "skimping" or sacrifice of quality to price in Beresford Submersible Pumps. They go down the borehole to stay there—and you can't afford to let up on quality if you want reliability. That's why we use bronze and stainless steel wherever possible—it may be more costly, but it certainly lasts longer. Next time you need a Submersible pump, we would like to tell you more about this and other Beresford features, meanwhile may we send you Publication PL310 giving further details?

BERESFORD *submersible* **PUMPS**

JAMES BERESFORD & SON LIMITED
(Member of the Cornercroft Group of Companies)
Ace Works, Kitts Green, Birmingham, 33
Telephone: Stechford 3081.

Branches at: London, Leeds, Manchester, Glasgow, etc.

BIG or small

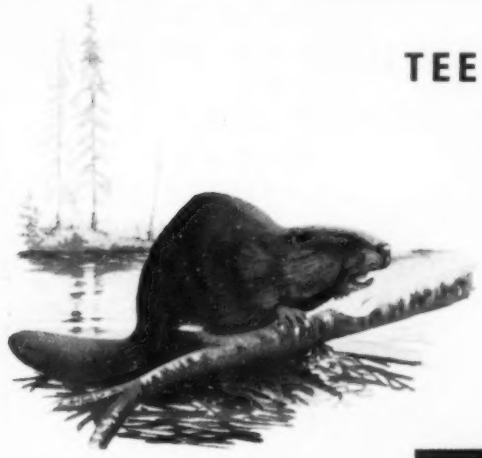
awkward or simple

...If it's a job for precision surface hardening with little dimensional change, then it's a job for the special skills and special equipment of Flame Hardeners. Whether you deal in quantities or have an individual hardening problem, call in Flame Hardeners from the start. Their experience and knowledge can save you a lot of trouble —not to mention cost!

CASTINGS, GEARS, TYRE ROLLS, CRANE WHEELS, BALL RACE RINGS, WIRE ROPE SHEAVES, AXLE PINS, CHAIN PINS AND LINKS, SHEAR BLADES, ROLL NECK RINGS, MACHINE TOOL BEDS, in fact anything and everything that requires precision surface hardening. Send for literature.

Flame Hardeners LTD

Everywhere in the British Isles served from:
SHORTER WORKS, BAILEY LANE, SHEFFIELD, 1. Telephone: Sheffield 21627



TEETH
for the JOB

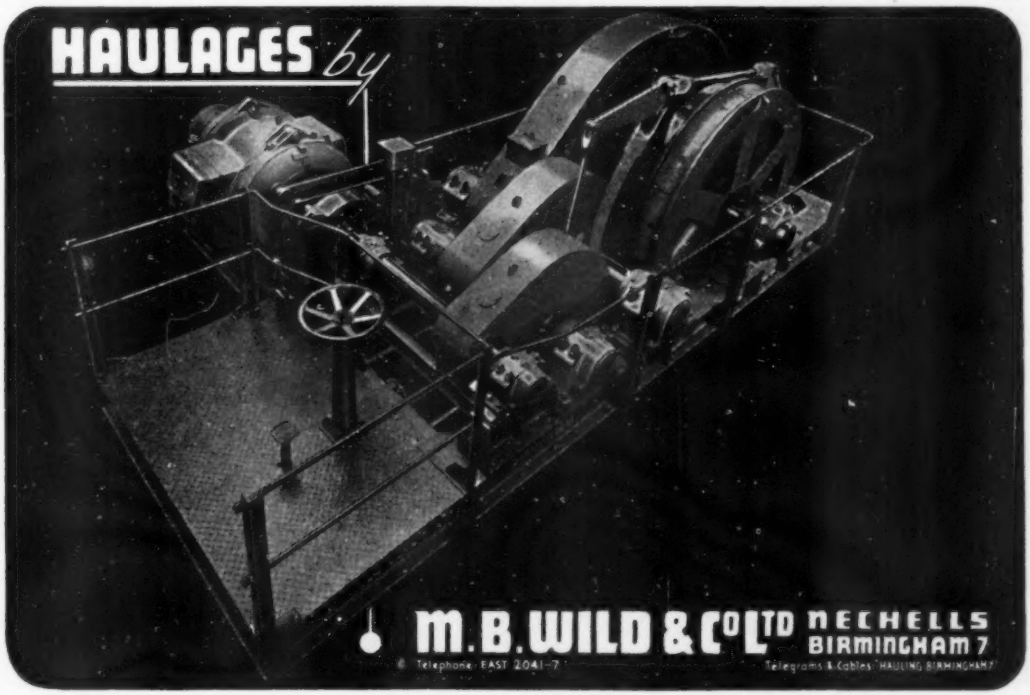
Aurora produce gears with teeth specifically designed to your requirements, spiral gears, worm gears, helical and double helical, bevel gears and spur gears.

AURORA
GEARS

AURORA GEARING CO. (WILMOT NORTH) **LTD. EDMUND RD., SHEFFIELD**

(A subsidiary of the Aurora Gear & Engineering Co. Ltd.)

Phone: Sheffield 24385-6-7 **Established 1880**



ANOTHER SUCCESS for * ACCOMATION!

ACCO Automatic Feed Control, incorporated in the raw coal feed circuit, maintains a uniformly steady condition in the box, which always operates at its optimum capacity, despite large variations in composition or quantity of feed.

Once the loading rate which gives best performances has been determined, the automatic feed control maintains this condition and enables the washbox to operate much closer to maximum feed for extended periods, improving the overall capacity and the regularity of washed product.

- *CAN BE APPLIED TO A SINGLE VARIABLE, e.g. SHALE CONTENT*
- *— OR CAN BE ASSOCIATED WITH AND CONTROL SEVERAL VARIABLES*
- *ELIMINATES BOTTLENECKS — IMPROVES PERFORMANCE*
- *EASILY FITTED AND ADAPTABLE TO DIFFERENT METHODS OF FEED*
- *CONSIDERABLE SAVINGS IN SUPERVISION AND MAINTENANCE*

Write for Publication AC127.

* ***'ACCOMATION'*** is the application of ACCO Automatic Control to all aspects of coal preparation.

ACCO
automatic
FEED CONTROL
for Washboxes
(PATENTED & PATENTS PENDING)

AUTOMATIC COAL CLEANING COMPANY LTD
DURRANHILL · CARLISLE
Telephone: Carlisle 24391 · Telegrams: Acco, Carlisle
AC. 132

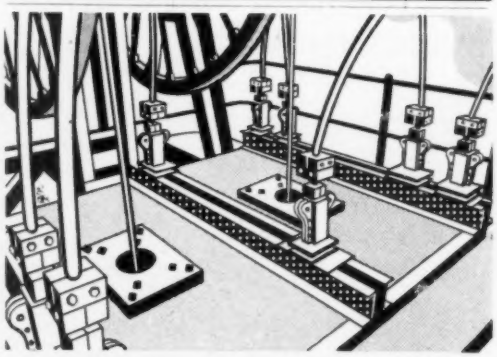
WORSLEY MESNES IRONWORKS LTD.
WIGAN

are Manufacturers of all Types of
MINING MACHINERY

•

Specialists in
Winding Drums · Drum Shafts and Breakdown Repairs

Telephone : **2246**
Telegrams : **"ENGINES," WIGAN**



"RELIANCE"

Specify "Reliance" attachments for your cage and skip winding ropes, balance ropes, haulage ropes, for the suspension and tensioning of your guide ropes, and for aerial ropeways.

Catalogues and technical literature available.

RELIANCE
RELIANCE ROPE ATTACHMENT COMPANY LIMITED
27 PARK PLACE CARDIFF · GT. BRITAIN
AD9

ANCHOR

Specialized chains for the mining and steel rolling industries

Any pattern for any purpose to your own specification. This special pusher type chain is of 1 x 2 combination and has an average breaking load of 120,000 lb.

All enquiries to

ANCHOR CHAIN COMPANY LIMITED
(Subsidiary of RENOLD CHAINS LIMITED)
OLDHAM, LANCASHIRE
Tel.: MAIN 1447 & 5928. Grams: "CHAINS" Oldham

W.S. *long life* SCREENS

The W.S. Welded Screen Cloth is the most Efficient Screen Mesh for Grading Iron Ore, Coke, Coal, Stone, Gravel, etc., on all types of Grading Plant.

Backed by a quarter of a century of experience service and courtesy

WADE. SMITH & Co LTD

ALMA STREET · WOLVERHAMPTON

Telephone: WOLVERHAMPTON 25395

Branch Offices: 215-217 BOROUGH HIGH STREET, LONDON, S.E.1. Telephone: HOP 3866

53 GLENCAIRN DRIVE, GLASGOW S.1. Telephone: POLLOCK 2459

BRIGHT STEEL

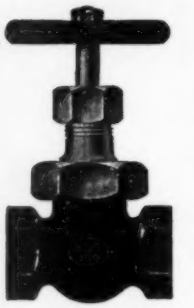
ROUNDS, SQUARES, HEXAGONS, FLATS AND SECTIONS

THE HALESOWEN STEEL CO. LTD.

HALESOWEN,
Nr. Birmingham
HALESOWEN 1191

8 Chatham Street,
MANCHESTER, 1
CENTRAL 0431

196/7, Palace Chambers,
Bridge Street,
LONDON, S.W.1
WHITEHALL 2015



B.S.S. Ltd.

SPECIALISE IN VALVES AND COCKS, BOTH SCREWED AND FLANGED FOR ALL DUTIES INCLUDING STEAM, WATER, OIL, GAS AND COMPRESSED AIR.

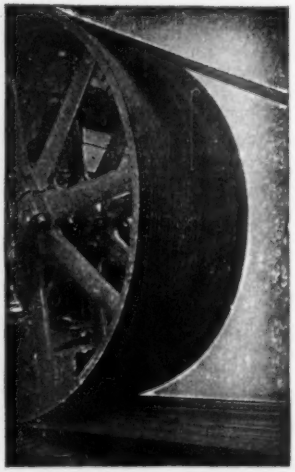
WE ALSO SPECIALISE IN PRESSURE AND VACUUM GAUGES AND HAVE EXCELLENT STOCKS AVAILABLE.

LARGE AND COMPREHENSIVE STOCKS OF ALL EQUIPMENT FOR STEAM, GAS, OIL, WATER AND AIR SERVICES ARE CARRIED AT ALL DEPOTS. PRICES AND DETAILS SENT ON REQUEST.

BRITISH STEAM SPECIALTIES LTD.
FLEET ST. LEICESTER

TELEPHONE - LEICESTER 20885-6-7
TELEGRAMS - "BOSS" PHONE LEICESTER

WIGGLESWORTHS
FOR POWER TRANSMISSION EQUIPMENT



Makers of
TEXROPE
V
DRIVES
PROVED BEST BY TEST

FRANK WIGGLESWORTH & CO. LTD.
ENGINEERS
SHIPLEY YORKSHIRE

BARKER-DAVIES
SUSPENSION EQUIPMENT

SAFETY DETACHING HOOKS

Also
ROPE CAPPELS
KEP GEAR
and
MINE SHAFT APPLIANCES

BARKER, DAVIES & CO., PONTYPRIDD, GLAMORGAN

Fig. 1.

Fig. 2.

Fig 3.

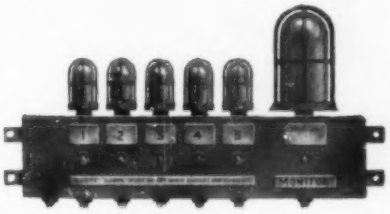


Fig. 4.

USEFUL FITTINGS FOR AIR COMPRESSORS

Fig. 1. "MONITOR" Flow Indicator with electric alarm for cooling-water system.
Fig. 2. "MONITOR" Electric pressure alarm for forced lubrication system.
Fig. 3. "MONITOR" Thermostat for air temperature alarm.
Fig. 4. "MONITOR" panel used in conjunction with alarms.

The above "Monitor" Alarms, have been supplied to numerous collieries at home and abroad. Send for descriptive leaflets.
Can be supplied F.L.P. or alternatively non-electric with whistle alarm.

"MONITOR" PATENT SAFETY DEVICES LTD. WALLSEND-ON-TYNE

C. L. STOKOE PATENTS REGD. TRADE MARK: "MONITOR"

Cemented Tungsten Carbide Mining Tools

ROTARY BITS FOR DRILLING IN COAL AND STONE

Standard Sizes:
Grades: Hard, Medium, Tough.
To N.C.B. Specification.

STANDARD SIZES ALWAYS IN STOCK. OTHERS QUICKLY SUPPLIED.

Birley

TUNGSTEN CARBIDE DEVELOPMENTS LTD.
BIRLEY WORKS, WOODHOUSE, SHEFFIELD
Telephone: WOODHOUSE 2555/6

INDEX TO ADVERTISERS—*continued from page 82.*

Jenkins, W. J. & Co. Ltd. .. —
Johnson Rolls Ltd. .. .. .. —
Jones, W. Stanley (Engineers) Ltd. .. .. —
Joy, Sullivan Ltd. 31

Kennedy, Allan & Co. Ltd. .. —
Kenyon, Wm. & Sons Ltd. .. —

Lafarge Aluminous Cement Co. Ltd. 65
Lanarkshire Bolt Ltd. .. —
Lanarkshire Steel Co. Ltd. 52 & 53
Lancaster & Tonge Ltd. .. —
Lane, Francis & J. S. Ltd. .. —
Ledward & Beckett Ltd. .. —
Lever, J. & Sons Ltd. .. —
Lilleshall Co. Ltd. .. .. —
Lindley, H. Ld. 46
Locker Industries Ld. .. 81
Lodge-Cottrell Ld. 27
Lumb, Jas. & Sons Ld. .. —
Lysaght's, Scunthorpe Works 55

Mackley, E. N. & Co. Ld. .. —
M. & C. Switchgear Ld. .. —
Markham & Co. Ld. .. .. —
Marley, Wilfred, Ld. .. .. —
Marshall, Thos. & Co. (Loxley) Ld. 6
Martin Black & Co. (Wire Ropes) Ld. 30
Massey, B. & S. Ld. .. .. —
Mastabar Mining Equipment Co. Ld. 19
Mather & Platt Ld. .. .. —
Matthews & Yates Ld. .. —
Mavor & Coulson Ld. .. 3
McClure, David Ld. .. .. —
Merer Ld. .. .. .. —
Mellowes & Co. Ld. .. .. —
Metalectric Furnaces Ld. .. —
Michael & Partners Ld. .. —
Midgley & Son Ld. .. .. —
Millom Hematite Ore & Iron Co. Ld. .. .. .. —
Mills, James Exors. of .. —
Mine Safety Appliances Co. Ld. .. .. —
Mining Engineering Co. Ld. .. 45
Mitchell Ropeways Ld. .. —
Mobil Oil Co. Ld. .. .. —
Mobile Lifting Services Ld. .. —
Moler Products Ld. .. .. —
Mond Nickel Co. Ld. .. .. —
"Monitor" Patent Safety Devices Ld. 79
Mono Pumps Ld. .. .. —
Moorwood, John M. Ld. .. —
Morgan Refractories Ld. .. 47
Morris, Robert Ld. .. .. —
Mowlem-Centraline .. .. —
Murex Welding Processes Ld. 64
Muschamp, N. J. & Co. Ld. —

National Boiler & General Insurance Co. Ld. .. .. —
National Coal Board .. .. —
National Industrial Fuel Efficiency Service .. .. —
Neal, R. H. & Co. Ld. .. —
Needham Bros. & Brown Ld. —
Nelson, W. & H. Ld. .. —
New Conveyor Co. Ld. .. —
Newell, Ernest & Co. Ld. .. —
Newton Chambers & Co. Ld. —
Niagara Screens & Plant Ld. —
Nife Batteries .. .. .. —
Nordberg Manufacturing Co. Ld. .. .. —
North British Rubber Co. Ld. 23
North Eastern Marine Engineering Co. Ld. .. .. —
Northfield Industrial Fabrications Ld. .. .. —
Norton Harty Engineering Co. Ld. .. .. —
Norton, Sir James Farmer & Co. Ld. 50
Nortons Tividale Ld. .. —

Oldham & Son Ld. .. .. —
Ormerod, Edward & Co. Ld. —
Osborn, S. & Co. Ld. .. —
Oughtibridge Silica Firebrick Co. Ld. .. .. .. —

Padley & Venables Ld. .. —
Parkes, Timothy, & Sons Ld. —
Parramore, F. & Sons Ld. .. —
Parsons, C. A. & Co. Ld. .. —
Parsons Chain Co. Ld. .. —
Parsons Marine Turbine Co. Ld. .. .. —
Patterson Lamps (1953) Ld. —
Pegson Ld. .. .. .. —
Permutit Co. Ld. .. .. —
P.G. Engineering Ld. .. —
Pickford, Holland & Co. Ld. —
Pittrail Ld. .. .. .. —
Power-Gas Corporation Ld. .. —
Power Gas Economy Co. .. —
Power Plant Co Ld. .. 67
Premier Cooler & Engineering Co. Ld. .. .. .. —
Press, Wm. & Son Ld. .. —
Price, J. T. & Co. Ld. .. —
Priest Furnaces Ld. .. .. —
Procter Bros. (Wireworks) Ld. —
Protector Lamp & Lighting Co. Ld. .. .. .. —
Pulsometer Eng. Co. Ld. .. 72

Qualter Hall & Co. Ld. .. —

Railway & Genera Engineering Co. Ld. .. .. —
Raine & Co. Ld. .. .. —
Ransomes & Marles Bearing Co. Ld. .. .. .. —
Rapid Magnetic Ld. .. .. —
Rawlplug Co. Ld. .. .. —
Reavell & Co. Ld. .. .. —
Reay Brass Foundry Co. Ld. —
Reid Gear Co. Ld. .. .. —
Reliance Rope Attachment Co. Ld. 76
Renold Chains, Ld. .. .. —
Reside, Jas. Ld. .. .. —
Revolvo Ld. .. .. .. —
Reyrolle, A. & Co. Ld. .. —
Rheolaveur General Construction Ld. .. .. .. —
Rhodes, S. & Co. Ld. .. 72
Rhymney Engineering Co. Ld. —
Richards, Chas. & Sons Ld. .. —
Richards Structural Steel Co. Ld. .. .. —
Richardsons Westgarth Atomic Ld. .. .. .. —
Richardsons Westgarth (Hartlepool) Ld. .. .. .. —
Rigley, Wm. & Sons Ld. .. —
Robertson, W. H. A. & Co. Ld. —
Robey & Co. Ld. .. .. —
Rocol Ld. .. .. .. —
Rolled Steel Products (London) Ld. .. .. .. —
Ropeways Ld. .. .. —
Ross Engineers Ld. .. .. —
Round Oak Steel Works Ld. —
Ruston & Hornsby Ld. .. —
Ruston-Bucyrus Ld. .. —

Sack, Maschinenfabrik, G.m.b.H. .. .. .. —
Salem-Brosius (England) Ld. 60
Saunders Valve Co. Ld. .. —
Sentinel (Shrewsbury) Ld. .. —
Shaw, W. & Co. Ld. .. .. —
Sheen (Nottingham) Ld. .. —
Sheepbridge Equipment Ld. —
Sheffield Twist Drill & Steel Co. Ld. .. .. .. —
Sheffield Wire Rope Co. Ld. —
Shell Mex & B.P. Ld. .. —
Siemens-Schuckert (G.B.) Ld. —
Silvertown Rubber Co. Ld. .. 7
Simon-Carves Ld. .. .. —
Simon, Richard & Sons Ld. .. —
Siskol Machines Ld. .. —
Skefko Ball Bearing Co. Ld. —
Skinningrove Iron Co. Ld. .. —
Smallman, Jas. W. Ld. .. 72
Smedley Bros. Ld. .. .. —
Smith & McLean Ld. .. —
Smith, John (Keighley) Ld. .. —
Smith, Thos. & Son (Rodley) Ld. .. .. —
South Wales Switchgear Co. Ld. .. .. —
Spencer-Bonecourt-Clarkson Ld. 25
Standall Engineering Co. Ld. —
Stanton Ironworks Co. Ld. .. —
Steam & Combustion Engineering Ld. .. .. —
Steel Co. of Wales Ld. .. —
Steels Engineering Products Ld. 15
Steelway Ld. .. .. —
Stein & Atkinson Ld. .. —
Stein, J. G. & Co. Ld. .. —
Stephens Silica Brick Co. Ld. —
Stewarts and Lloyds Ld. .. 1
Stone-Wallwork Ld. .. .. —
Stothert & Pitt Ld. 8
Strachan & Henshaw Ld. .. —
Structural Painters Ld. .. —
Sturdy Electric Co. Ld. .. —
Summerson, Thos. & Sons Ld. —
Sutcliffe, Richard Ld. .. 42
Sutcliffe, Speakman & Co. Ld. —

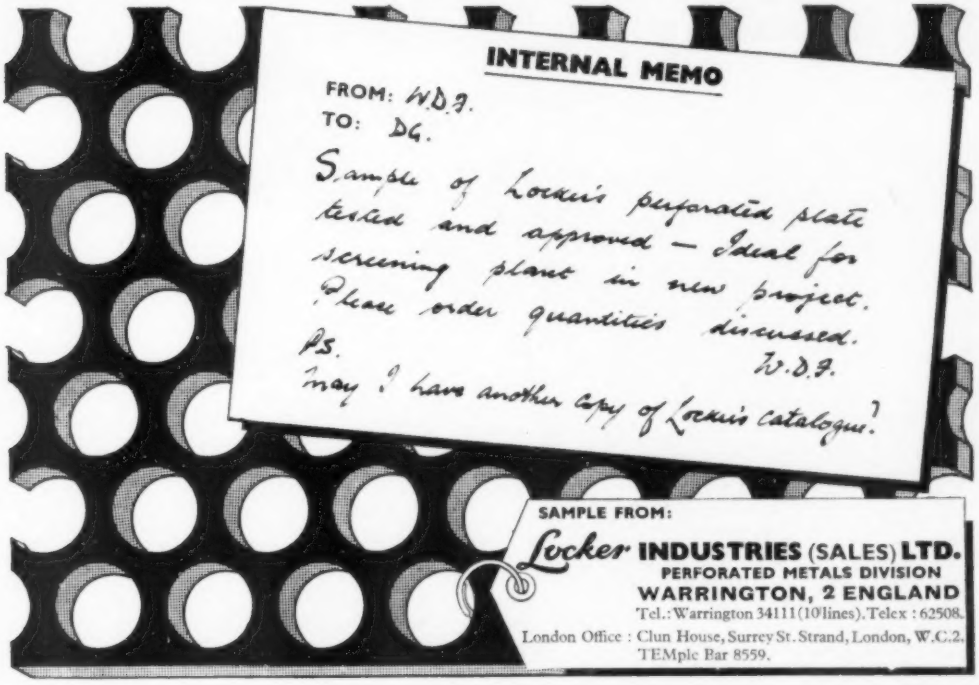
Tattersall & Sons Ld. .. —
Taylor, F. & Sons (Manchester) Ld. .. .. .. —
Tees Side Bridge & Engineering Works Ld. .. .. —
Thermal Syndicate Ld. .. —
Thomas (Richard) & Baldwins Ld. 13
Thompson, John Conveyor Co. —
Thompson, John, (Triumph Stokers) Ld. .. .. —
Thompson, John, Water Tube Boilers Ld. 57
Thompson & Southwick Ld. —
Thornton, B. Ld. 10
Town, Fredk. & Sons Ld. .. —
Trewella Bros. (Pty.) Ld. .. —
Tungsten Carbide Developments Ld. 79
Turner Bros. Asbestos Co. Ld. —

Underground Mining Machinery Ld. .. .. .. —
Unifloc Ld. .. .. .. —
United Fireclay Products Ld. 26
United States Metallic Packing Co. Ld. .. .. —
United Steel Companies Ld. —
United Wire Works Ld. .. —
Uskside Engineering Co. Ld. —

Vallak G.B. Ld. .. .. —
Vaughan Crane Co. Ld. .. —
Victor Products (Wallsend) Ld. .. .. —
Visco Engineering Co. Ld. .. —

Wade, Smith & Co. Ld. .. 77
Wailes Dove Bitumastic Ld. —
Walker Bros. (Wigan) Ld. .. —
Wallacetown Engineering Co. Ld. .. .. —
Wallsend Slipway & Engineering Co. Ld. .. .. —
Walmsleys (Wigan) Ld. .. —
Ward, Thos. W. Ld. .. 73
Warner & Co. Ld. .. .. —
Wellman Bibby Co. Ld. .. —
Wellman Smith Owen Engineering Corporation Ld. .. 33
West Bromwich Spring Co. Ld. —
Westinghouse Brake & Signal Co. Ld. .. .. .. —
West's (Manchester) Ld. .. —
West's Piling & Construction Co. Ld. .. .. .. —
Westwood, Dawes & Co. Ld. —
Wharton Crane & Hoist Co. Ld. .. .. —
Whipp & Bourne Ld. .. —
White, R. & Sons (Engrs.) Ld. —
Whittaker, C. & Co. Ld. .. —
Wickman Ld. .. .. .. —
Widnes Foundry & Engineering Co. Ld. .. .. —
Wigglesworth, F. & Co. Ld. .. 78
Wild, A. G. & Co. Ld. .. —
Wild, M. B. & Co. Ld. .. 75
Willcox, W. H. & Co. Ld. .. 81
Wincott, G. P. Ld. 48
Wombwell Foundry & Engineering Co. Ld. .. .. —
Wood, Hugh & Co. Ld. .. 62
Woodall-Duckham Construction Company Limited .. 51
Woodhouse, Joseph Chains Ld. .. .. —
Worsley-Mesnes Ironworks Ld. 76
Wright, Joseph & Co. (Fabrications) Ld. 61

Yeadon, Son & Co. Ld. .. —


INTERNAL MEMO
FROM: W.D.J.
TO: D.G.
Sample of Locker's perforated plate tested and approved — Ideal for screening plant in new project. Please order quantities discussed.
P.S. W.D.J.
May I have another copy of Locker's catalogue?
SAMPLE FROM:
Locker INDUSTRIES (SALES) LTD.
PERFORATED METALS DIVISION
WARRINGTON, 2 ENGLAND
Tel.: Warrington 34111 (10 lines). Telex : 62508.
London Office : Clun House, Surrey St. Strand, London, W.C.2.
TEMple Bar 8559.

Willcox's
for ALL
ENGINEERING
SUPPLIES
W. H. WILLCOX & CO., LTD.
SOUTHWARK STREET, LONDON, S.E.1
'Phone: HOP 8022 (25 lines)

INDEX TO ADVERTISERS

Adamson Alliance Co. Ltd. .. 83
Aerex Ltd. .. .. .. —
Allen, Edgar & Co. Ltd. .. 44
Allen West & Co. Ltd. .. 49
Allis-Chalmers (Great Britain) Ltd. .. .. .. —
Anchor Chain Co. Ltd. .. 77
Anderson, Boyes & Co. Ltd. .. —
Angus, Geo. & Co. Ltd. .. —
Appleby-Frodingham Steel Co. .. .. .. —
Armstrong-Whitworth (Metal Industries) Ltd. .. .. —
Armytage & Sons Ltd. .. 72
Arrol, Sir Wm. & Co. Ltd. .. —
Ashmore, Benson, Pease & Co. Ltd. .. .. .. —
Ashworth, E. & A., Ltd. .. —
Associated British Machine Tool Makers Ltd. .. .. —
Associated Electrical Industries Ltd. (Electronic Apparatus Division) .. —
Associated Electrical Industries Ltd. (Heavy Plant Division) .. .. .. —
Associated Electrical Industries Ltd. (Instrumentation Division) .. .. —
Associated Electrical Industries Ltd. (Motor & Control Gear Division) .. —
Associated Electrical Industries Ltd. (Switchgear Division) .. .. .. —
Associated Electrical Industries Ltd. (Traction Division) —
Associated Electrical Industries Ltd. (Transformer Division) .. .. .. —
Associated Electrical Industries Ltd. (Turbine Generator Division) .. —
Atlas Copco (G.B.) Ltd. .. —
Aurora Gearing Co. (Wilmot North) Ltd. 75
Austin, Jas. & Sons (Dewsbury) Ltd. .. .. —
Auto-Klean Strainers Ltd. .. —
Automatic Coal Cleaning Co. Ltd. 76
Aveling-Barford Ltd. .. 32

Bagnall, W. G. Ltd. .. .. —
Bairds & Scottish Steel Ltd. .. —
Barker, Davies & Co. .. 78
Barlow & Chidlaw Ltd. .. —
Barnes & Bell Ltd. .. 72
Barrow Ironworks Ltd. .. —
Bathgate, Richard A. .. —
Bayliss, Jones & Bayliss Ltd. .. —
Beckett & Anderson Ltd. .. —
Becorit (G.B.) Ltd. .. 20 & 21
Beldam Asbestos Co. Ltd. .. —
Belliss & Morcom Ltd. .. —
Belmos Co. Ltd. .. 40
Beresford, Jas. & Son Ltd. .. 74
Birkett, Billington & Newton Ltd. .. .. .. —
Birlec-Efco (Melting) Ltd. .. —
Birtley Engineering Ltd. .. —
Blacks Mining Equipment .. —
Blandford-Gee Cementation Co. Ltd. .. .. —
Blantyre Engineering Co. Ltd. —
Bolton Gate Co. Ltd. .. —
Bonser Tristram Ltd. .. —
Boyles Bros. Drilling Co. Ltd. —
Bradley, J. & Co. (Stourbridge) Ltd. .. .. .. —
Bradley Pulveriser Co. Ltd. .. —
B.R.D. Co. Ltd. 84
Brightside Foundry & Engineering Co. Ltd. .. .. —
British Belting & Asbestos Co. Ltd. .. .. —
British Electrical Repairs Ltd. —
British Iron and Steel Federation .. .. —
British Jeffrey-Diamond Ltd. 22
British Nylon Spinners Ltd. .. —
British Oxygen Co. Ltd. .. —
British Paints Ltd. .. .. —
British Resistor Co. Ltd. .. —
British Rollmakers Corporation Ltd. .. .. .. —
British Ropeway Engineering Co. Ltd. .. .. .. —
British Steam Specialties Ltd. 78
British Timken: Division of the Timken Roller Bearing Co. .. .. .. —
Broadbent, Thos. & Sons Ltd. —
Brown, David Corporation (Sales) Ltd. .. .. —
Brush Electrical Engineering Co. Ltd. .. .. .. —
B.T.R. Industries Ltd. .. —
Buell Ltd. .. .. —
Burnand, W. E. & Son Ltd. .. —
Burnside, George Ltd. .. .. —
Burtonwood Engg. Co. Ltd. .. —
Bushing Co. Ltd. .. .. —

Cable Belt Ltd. 54
Calomax (Engineers) Ltd. .. —
Carblox Ltd. .. .. .. —
Cascade Water Coolers Ltd. .. —
Case, J. I. Co. Ltd. 58 & 59
Cast Basalt Products Ltd. .. —
Ceag Ltd. .. .. .. —
Chloride Batteries Ltd. .. —
Churchill Machine Tool Co. Ltd. —
Clarke, Chapman & Co. Ltd. .. —
Clark, Geo. & North Eastern Marine (Sunderland) Ltd. .. —
Clayton Equipment Co. Ltd. .. —
Cleveland Bridge & Engineering Co. Ltd. .. .. —
Cohen Bros. (Electrical) Ltd. —
Cohen, Geo. Sons & Co. Ltd. .. 56
Colvilles Ltd. .. .. .. —
Conflow Ltd. .. .. .. —
Consett Iron Co. Ltd. .. —
Consolidated Pneumatic Tool Co. Ltd. .. .. —
Cooke, Troughton & Simms Ltd. —
Cooper, Jas. Milne & Co. Ltd. —
Cooper Roller Bearings Co. Ltd. —
Coppee Co. (Gt. Britain) Ltd. —
Cotterill, Herbert Ltd. .. —
Coulson, M. & Co. Ltd. .. —
Courtaulds Ltd. .. .. —
Cowlishaw, Walker & Co. Ltd. —
Cox & Danks Ltd. 12
Crawley Industrial Products Ltd. .. .. .. 16 & 17
Cripps, R. & Co. Ltd. .. 11
Croda Ltd. .. .. .. —
Crofts (Engineers) Ltd. .. —
Crompton Parkinson Ltd. .. 4
Crushing, Screening & Engineering Ltd. .. .. —
Curtis, A. L. (Onx) Ltd. .. —

Davenport Engineering Co. Ltd. .. .. .. —
Davey, Paxman & Co. Ltd. .. —
Davis, John & Son (Derby) Ltd. .. .. .. —
Davy & United Engineering Co. Ltd. .. .. .. —
Davy & United Roll Foundry Ltd. 2
Dawson & Downie Ltd. .. —
Demag A.G. .. .. .. —
Demolition & Construction Co. Ltd. .. .. —
Denison, Samuel & Sons Ltd. —
Distington Engineering Co. Ltd. .. .. 36 & 37
D.M.M. (Machinery) Ltd. .. —
Dobson, W. E. & F. Ltd. .. —
Dollery & Palmer Ltd. 38 & 39
Donkin Bryan Co. Ltd. .. —
Dorman Long & Co. Ltd. .. —
Dougall, James & Sons Ltd. .. —
Dowty Mining Equipment Ltd. 18
Dunlop Rubber Co. Ltd. .. —

Eagre Construction Co. Ltd. .. —
Edge & Sons Ltd. .. .. —
Eickoff, Gebr. .. .. .. —
Eimco (Gt. Britain) Ltd. .. 69
Elastic Rail Spike Co. Ltd. .. —
Elcordia Ltd. .. .. .. —
Electrical Development Association .. .. —
Electric Furnace Co. Ltd. .. —
Electro-Hydraulics Ltd. .. —
Ellis, A. & Sons (Wakefield) Ltd. .. .. .. —
Engineering, Marine, Welding & Nuclear Energy Exhibition .. .. .. —
English Drilling Equipment Co. Ltd. .. .. —
English Electric Co. Ltd. .. —
English Steel Corporation Ltd. —
Evans, Joseph & Sons (Wolverhampton) Ltd. .. 73
Ewart Chainbelt Co. Ltd. .. —

Fearnehough, W. Ltd. .. —
Felco Hoists Ltd. .. .. —
Fenner, J. H. & Co. Ltd. .. 9
Fielding & Platt Ltd. .. —
Finlay Engineering Co. Ltd. .. —
Firth, Thos. & John Brown Ltd. 28
Firth-Vickers Stainless Steels Ltd. .. .. .. —
Fisher & Ludlow Ltd. .. —
Flame Hardeners Ltd. .. 74
Follsain-Wycliffe Foundries Ltd. .. .. .. —
Foraky Boring & Shaft Sinking Co. Ltd. .. .. —
Forster, T. S., & Sons Ltd. .. —
Foster, H. Johnson., Ltd. .. —
Foster, Henry & Co. Ltd. .. —
Foundry Services Ltd. .. —
Fowler, John & Co. (Leeds) Ltd. .. .. .. —
Fuel & Metallurgical Processes Ltd. .. .. —
Fullerton, Hodgart & Barclay Ltd. 5

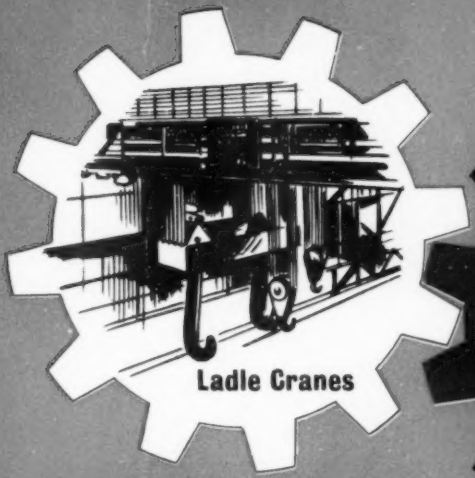
Gas Council .. .. .. —
General Electric Co. Ltd. .. —
General Refractories Ltd. .. 14
Gent & Co. Ltd. .. .. —
Gibbons Bros. Ltd. .. .. —
Gibbons (Dudley) Ltd. .. .. —
Glover Bros. (Mossley) Ltd. .. —
Glover, Wm. Jas. & Co. Ltd. .. —
Goodall, Clayton & Co. Ltd. .. —
Goodyear Tyre & Rubber Co. Ltd. .. .. —
Green, E. & Sons Ltd. .. .. —
Green, Horace & Co. Ltd. .. —
Greening, N. & Sons Ltd. .. —
Guest, Keen Iron & Steel Works .. .. .. —
Gullick Ltd. .. .. .. —
Gutehoffnungshutte Sterkrade —

Hackbridge & Hewittic Electric Co. Ltd. .. .. .. —
Hadfields Ltd. .. .. .. —
Halesowen Steel Co. Ltd. .. 78
Hall Bros. (West Bromwich) Ltd. .. .. —
Hallamshire Steel Co. Ltd. .. —
Hanmade Conveyor Co. Ltd. .. —
Hardman, E. Son & Co. Ltd. .. —
Harland Engineering Co. Ltd. —
Harlow, Robt. & Son Ltd. .. —
Harvey, G. A. & Co. (Ldn.) Ltd. —
Hastie, Bernard & Co. Ltd. .. —
Hatchett & Co. Ltd. .. .. —
Hayden-Nilos Ltd. 34
Head, Wrightson & Co. Ltd. .. —
Head, Wrightson Minerals Engineering Ltd. 35
Head, Wrightson Machine Co. Ltd. .. .. —
Head, Wrightson Teesdale Ltd. .. .. —
Heap, Joshua & Co. Ltd. .. 8
Heeley (Mining Machinery) Co. Ltd. .. .. .. —
Hick, Hargreaves & Co. Ltd. .. 41
Hill, Richard Ltd. .. .. —
Hills (West Bromwich) Ltd. .. —
Holman Bros. Ltd. .. .. —
Holmes, W. C., & Co. Ltd. .. —
Holroyd, John & Co. Ltd. .. 24
Honeywell Controls Ltd. .. —
Hopkinson, A. & Co. Ltd. .. —
Hornsby & Goodwyn Ltd. .. —
Hoy, Austin & Co. Ltd. .. —
Hudswell, Clarke & Co. Ltd. .. —
Humber Graving Dock and Engineering Co. Ltd. .. —
Hunslet Engine Co. Ltd .. —
Huntington, Heberlein & Co. Ltd. 43

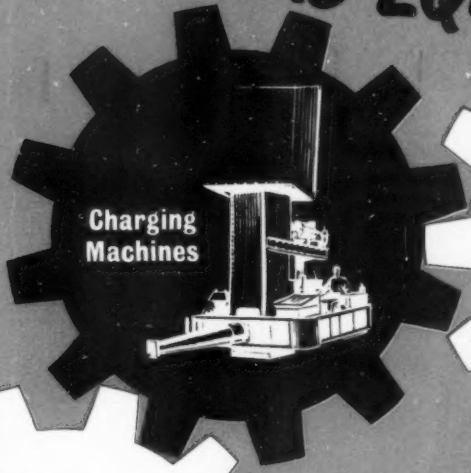
Imperial Chemical Industries Ltd. .. .. —
Incandescent Heat Co. Ltd. .. —
International Combustion Products Ltd. .. .. —
International Construction Co. Ltd. .. .. .. —
International Harvester Co. of Great Britain Ltd. .. 29
Intrafor Mining Engineers Ltd. 72

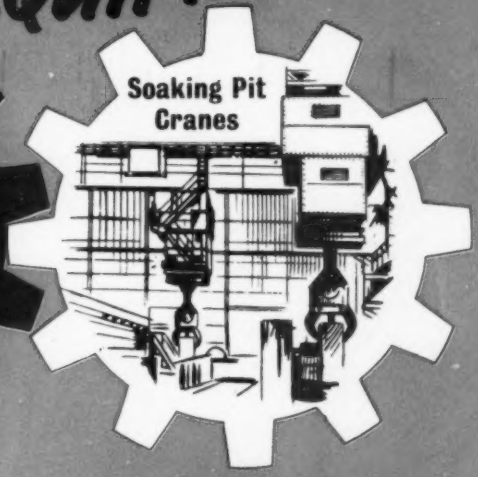
(*Continued on page 80*)

Published by the Proprietors, INDUSTRIAL NEWSPAPERS (FUEL & METALLURGICAL), LIMITED, John Adam House, 17/19, John Adam Street, London, W.C.2, and Printed in Great Britain, by HARRISON & SONS, LIMITED, by Appointment to Her Majesty The Queen, Printers, London, Hayes (Middx) and High Wycombe.



STEELWORKS EQUIPMENT





AA

ADAMSON-ALLIANCE Co. LTD.

Head Offices: Marlon House, 71-4 Mark Lane, London, E.C.3. Tel: ROYal 4801/2

Incorporating the Steelworks Divisions of
JOSEPH ADAMSON & CO. LTD · HYDE · CHESHIRE
THE HORSEHAY CO. LTD · WELLINGTON · SALOP

IRON & COAL

THE IRON AND COAL TRADES' REVIEW

VOL. 182
No. 4,848

Offices: John Adam House, 17/19, John Adam Street, London, W.C.2
LONDON: FRIDAY, JUNE 16, 1961

Registered as a Newspaper.
Single copies 1s. By post 1/4.
Ann. Subs.: 52s. (Abroad 60s.)

Safety with Economy...

Initial cost and maintenance lower than any comparable prop.

Fully approved by National Coal Board Approval No. H.7.

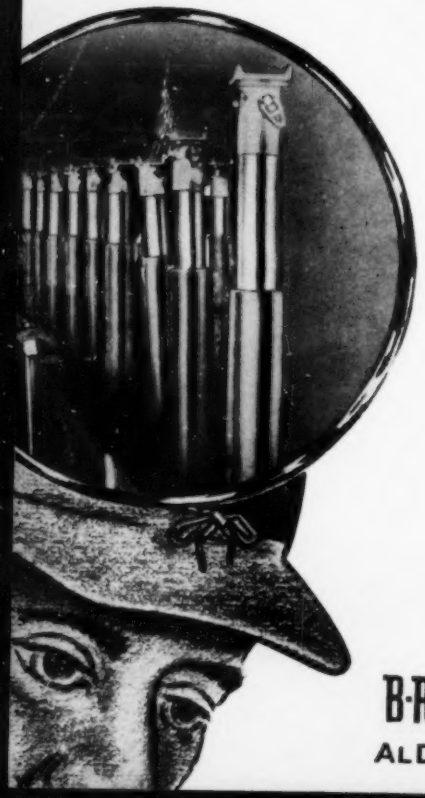
Write for illustrated brochure.

POLAR

hydraulic

props

by B-R-D



B-R-D COMPANY LIMITED
ALDRIDGE STAFFS ENGLAND

A MEMBER OF THE GKN GROUP OF COMPANIES